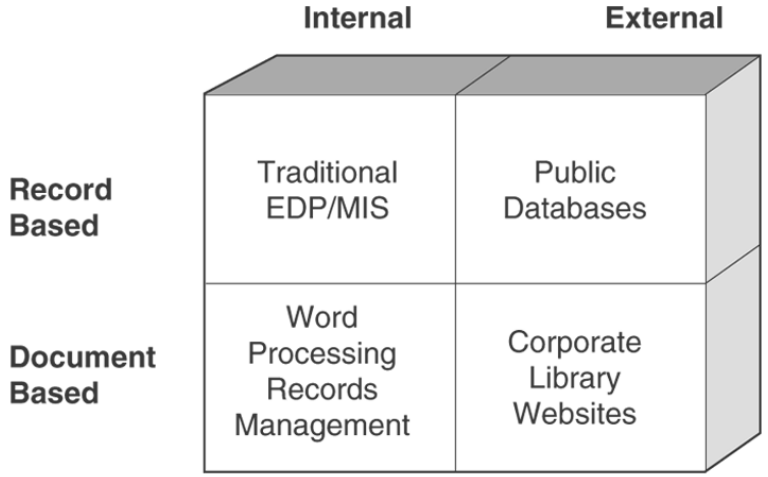
Information System Management

Chapter-06: Managing Corporate Information Resources

Lecture-01

Managing Information

Figure 7.3 Four Types of Information



What is the main job of IS department? - Managing Information or Technology ?

- Both are important. The Technology can be viewed as the infrastructure and the information as the asset that runs on that infrastructure.

Record-based data contains mainly facts about entities and is housed in data records.

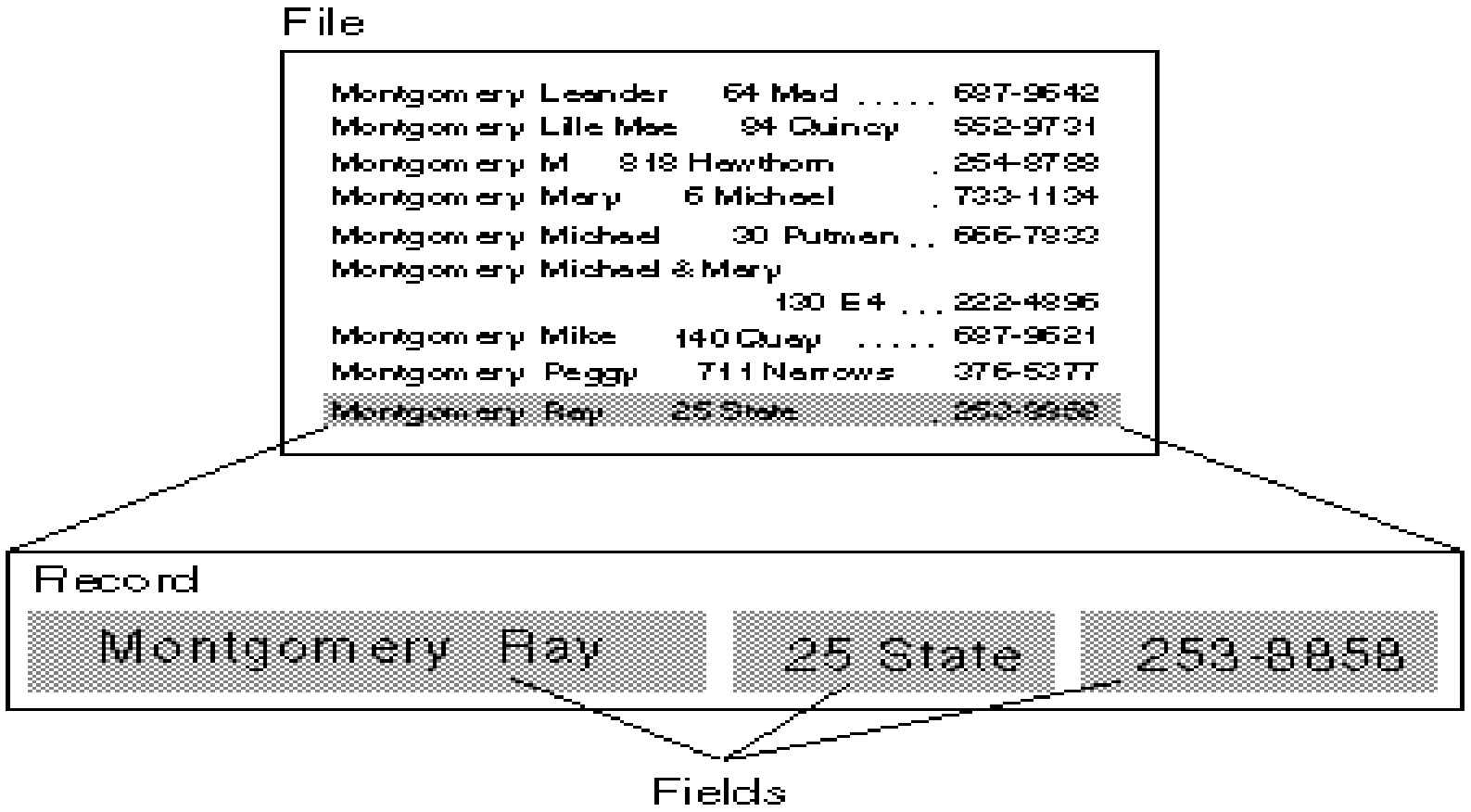
Document-based information deals with concepts, such as ideas, thoughts, and opinions and is housed in documents, messages, and video and audio clips.

Figure 7.4 Structure of Information

	Data Records	*Documents*
Item of interest	Entity	Concept or idea
Attribute of item	Field	Set of symbols
All attributes for item	Record	Logical paragraph
All related items	File	Document
A group of related files	Database	File cabinet
A collection of databases	Application system	Library, records center
Data "models" (representational approaches)	Hierarchical, relational, etc.	Keywords, hypertext

FIELDS, RECORDS AND FILES

You can think of a traditional database as an electronic filing system, organized by fields, records, and files. A field is a single piece of information; a record is one complete set of fields; and a file is a collection of records. For example, a telephone book is analogous to a file. It contains a list of records, each of which consists of three fields: name, address, and telephone number.



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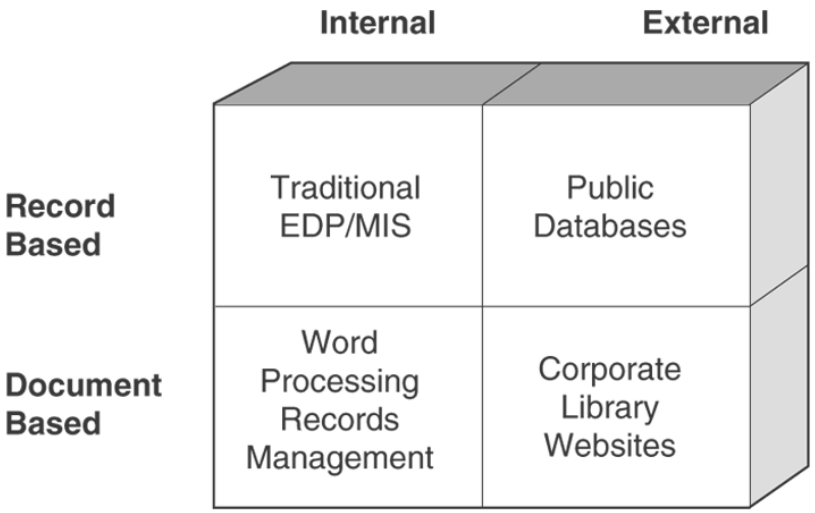


Internal record-based information

- it was the main focus of IS organizations because it is the type of information that computer applications generate and manage easily.

External record-based information

- can be accessed over internet or through other electronic means via public databases.
- End-users generally procure this type of data by subscribing to database services.

Internal and external document based information

- Until now, this information received little attention from IS organizations, because it has been so difficult to manipulate in computer.
- With the development of intranet, documents are now an integral part of information

Examples:

a) Managing Record based information – Data warehouse

b) Managing document based information – Document management and web content management.

Figure 7.5 The Scope of Information Management

	Typical Corporate Authority	*Information Sources*	*Technologies Used*
Internal record-based information	Information systems department	Transaction processing Organizational units	DBMS Data dictionaries Enterprise data analysis techniques
Internal document-based information	Administrative vice president Word processing center Records management	Corporate memos, letters reports, forms, e-mail	Word processing Micrographics Reprographics Text retrieval products
External record-based information	End users Corporate planning Financial analysis Marketing	Public databases	Internet-based services Public networks Analysis packages
External document-based information	Corporate library	Public literature News services Catalogs and indexes Subscriptions Purchased reports	Bibliographic services Environmental scanning Public networks

What is Data Warehousing?

A Data Warehousing (DW) is process for collecting and managing data from varied sources to provide meaningful business insights. A Data warehouse is typically used to connect and analyze business data from heterogeneous sources. The data warehouse is the core of the BI system which is built for data analysis and reporting.

A Data Warehouse is a collection of software tools that help analyze large volumes of disparate data from varied sources to provide meaningful business insights.

It is a blend of technologies and components which aids the strategic use of data. It is electronic storage of a large amount of information by a business which is designed for query and analysis instead of transaction processing. It is a process of transforming data into information and making it available to users in a timely manner to make a difference.

The **decision support database (Data Warehouse)** is maintained separately from the organization's operational database. However, the data warehouse is not a product but an environment. It is an architectural construct of an information system which provides users with current and historical decision support information which is difficult to access or present in the traditional operational data store.

Data warehouses appeared in the early 1990s, a bit before ERP systems. Like ERP systems, they, too, spurred getting record-based data into shape.
Data warehouses differ from operational databases in that they do not house data used to process daily transactions. Operational databases are meant to be updated to hold the latest data on, say, a customer's flight reservation, the amount of product in inventory, or the status of a customer's order. Data warehouses are not. The data are generally obtained periodically from transaction databases—five times a day, once a week, or maybe just once a month.

The warehouse thus presents a snapshot at a point in time. They are not updated as events occur, only at specific points in time.
Unlike transaction databases, data warehouses are used with tools for exploring the data. The simplest tools generate preformatted reports or permit ad hoc queries.

The most common type of data in a warehouse is customer data, which is used to discover how to more effectively market to current customers as well as noncustomers with the same characteristics. As a result, the marketing department has, in large part, been the driving force behind warehouses. They want to use customer data—from billing and invoicing systems, for example—to identify customer clusters and see the effect different marketing programs have on these clusters.
Data warehouses are seen as strategic assets that can yield new insights into customer behavior, internal operations, product mixes, and the like.
Due to the strategic nature of such uses of data, warehousing projects need sponsorship from top management, not only to provide funding and guide the project in truly strategic uses, but also to ensure that departments cooperate and yield up their data for cross-correlations.

Data Warehouses

Data Warehouses: Houses data used to make decisions.

- The data are generally obtained periodically from transaction databases, thus presenting a snapshot of a situation at a specific time.
- Data warehouses are seen as strategic assets and need sponsorship from top management.
- Example: The most common data warehoused are customer data, used to discover how to market more effectively to current customers as well as non-customers with the same characteristics.

Key Concepts

Metadata: "Data about data"

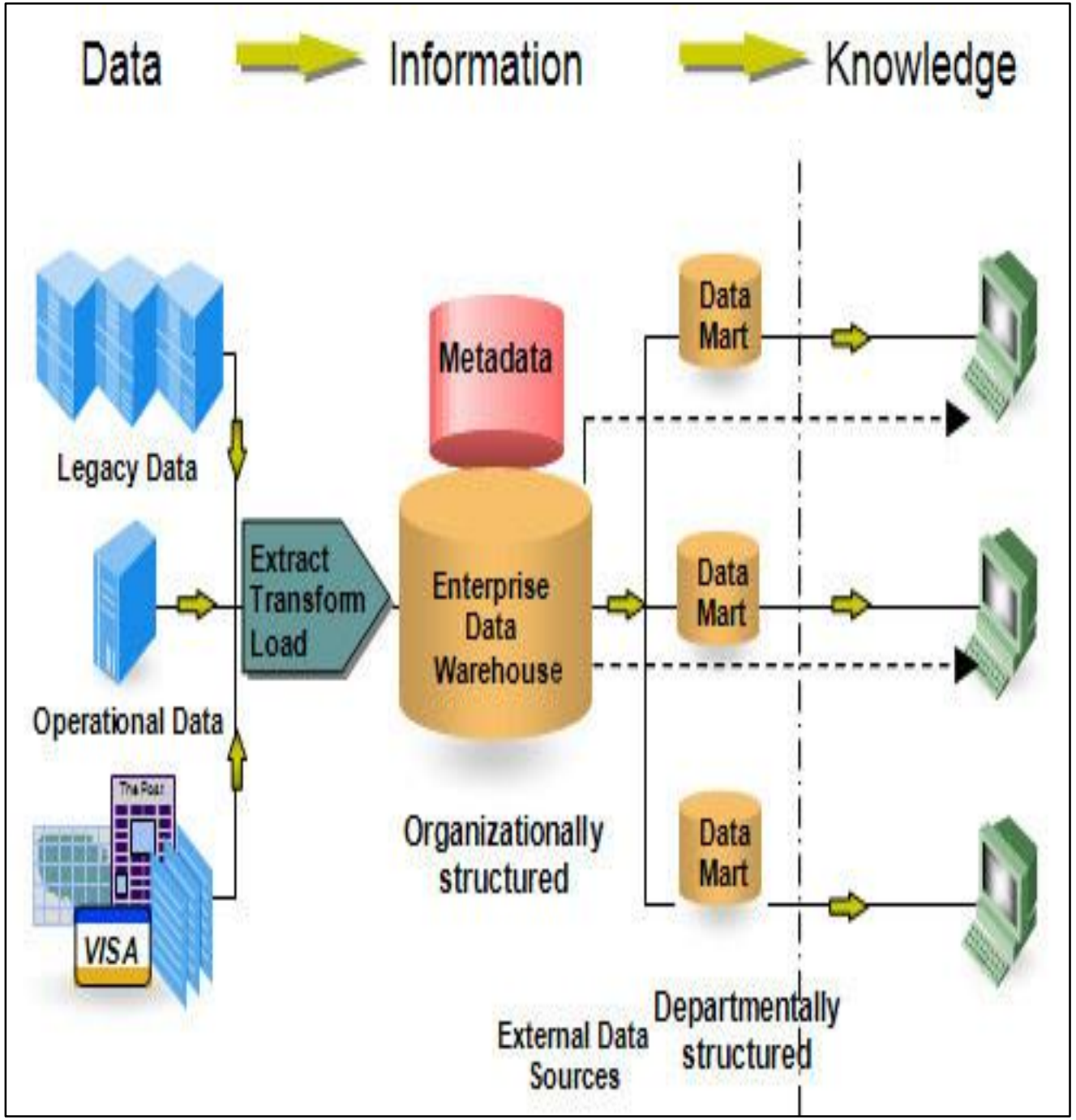
- Metadata explains the meaning, source, and owner of each data element, who can access each elements, how each elements relates with others and so on.
- Metadata set the standards. Without it, data from different legacy systems can not comparable, so, data will not be "clean".
- A metadata librarian is needed to keep it up-to-date, to enforce the standards, and even to educate users about metadata features of the warehouse.

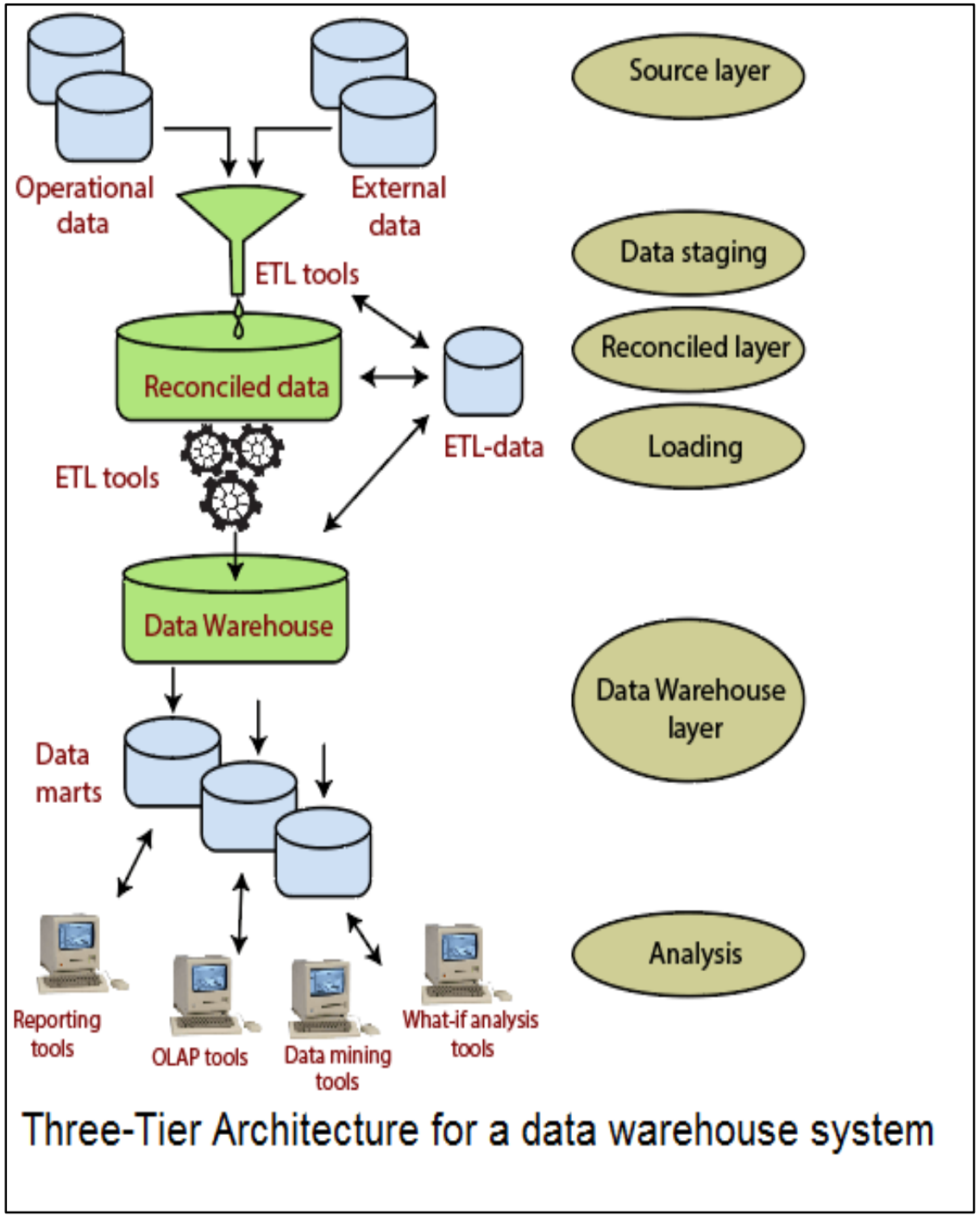
Quality data: is the cleaning process to adhere to metadata standards.

- The older the data the more suspect its quality. The older the data, the more suspect their quality. However, because users want to track items over time, even with poor quality, data-warehousing teams cannot discard the old, poor-quality data.

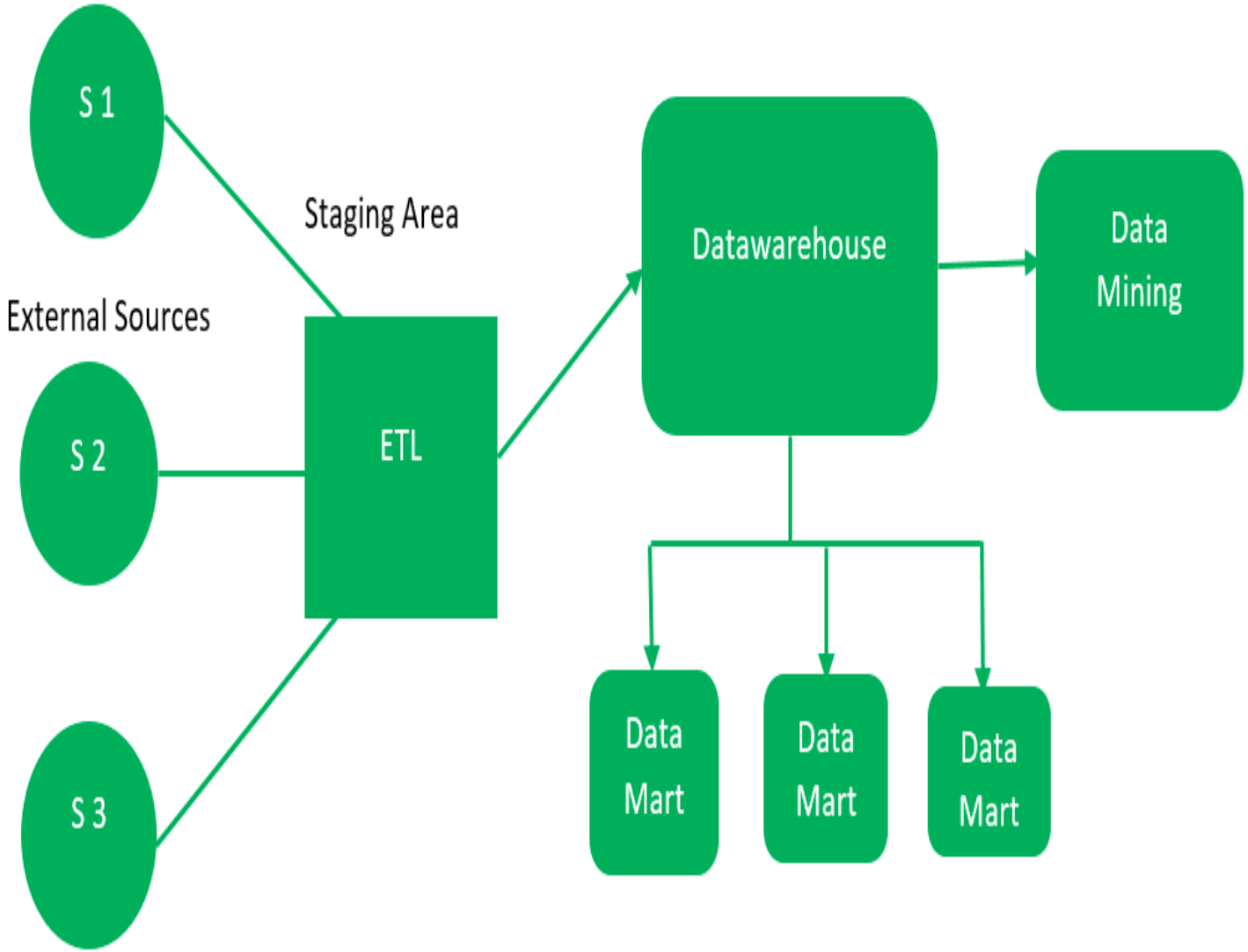
Data marts (Subsets of data warehouses): is a subset of data pulled off the warehouse for a specific group of users.

- Less expensive and easier to search. So, many companies now started data warehouses in reverse order- first creating data marts, then data marts are combined in warehouses.
- same definitions, i.e., unifying metadata should be used in all marts, otherwise data cannot be meaningfully correlated in the warehouse.





Three-Tier Architecture for a data warehouse system



There are many Data Warehousing tools are available in the market. Here, are some most prominent one:

Oracle: Oracle is the industry-leading database. It offers a wide range of choice of data warehouse solutions for both on-premises and in the cloud.

MarkLogic: MarkLogic is useful data warehousing solution that makes data integration easier and faster using an array of enterprise features. This tool helps to perform very complex search operations.

Amazon RedShift: Amazon Redshift is Data warehouse tool. It is a simple and cost-effective tool to analyze all types of data using standard SQL and existing BI tools.

BiG EVAL, CData Sync, Xplenty, QuerySurge, MS SSIS

Data warehouse system is also known by the following name:

- Decision Support System (DSS)
- Executive Information System
- Management Information System
- Business Intelligence Solution
- Analytic Application
- Data Warehouse

A typical data-warehousing project consists of five main steps:

1. Define the business uses of Data
   - Warehousing projects solely run IS department without a sponsoring user department are generally unsuccessful.

↓

2. Create the data model for the warehouse
   - Defining the relationship between the data elements.

↓

3. Cleanse the data
   - moving data out of operations and transform into standard format.
   - Transformation is manual and may require to handle missing data

↓

4. Select the user tools
   - Consider the users point of view by selecting the tools they will use and then training them on tool use.

↓

5. Monitor usage and system performance
   - Warehouse teams need to be particularly alert to changes in use. In many cases, usage begins slowly. But when it catches on, performance can degrade seriously as the system

Make sure that Data is right.

Document Management

Even in today's internet-rich world, Document plays a major role in most enterprise.

Document Type	Who manage in past ?	What Now ?
Internal	Vice-president.	➢ intranet house many formal paper-based documents. ➢ more technology **such as micrographics and computer outputs** are added to the documents.
External	Corporate librarians.	➢ External documents become huge. ➢ placed in webs **(brought to the attention of CIO)**.

Documents are unstructured – So, most of them cannot be fit into database.

EDMS is an acronym for Electronic Document Management System. As the name indicates, these systems are employed to store, organize, manage, share, and track an organization's files and documents.

Electronic Document Management, or EDM, is the process of managing information, data and documents digitally. EDM software allows its users to create a document, either from scratch within the system or by converting a hard copy into an electronic format. This information can then be easily stored, shared, edited, printed, and processed.

What other terms are used to refer to an EDMS?

EDMSs are commonly referred to as:

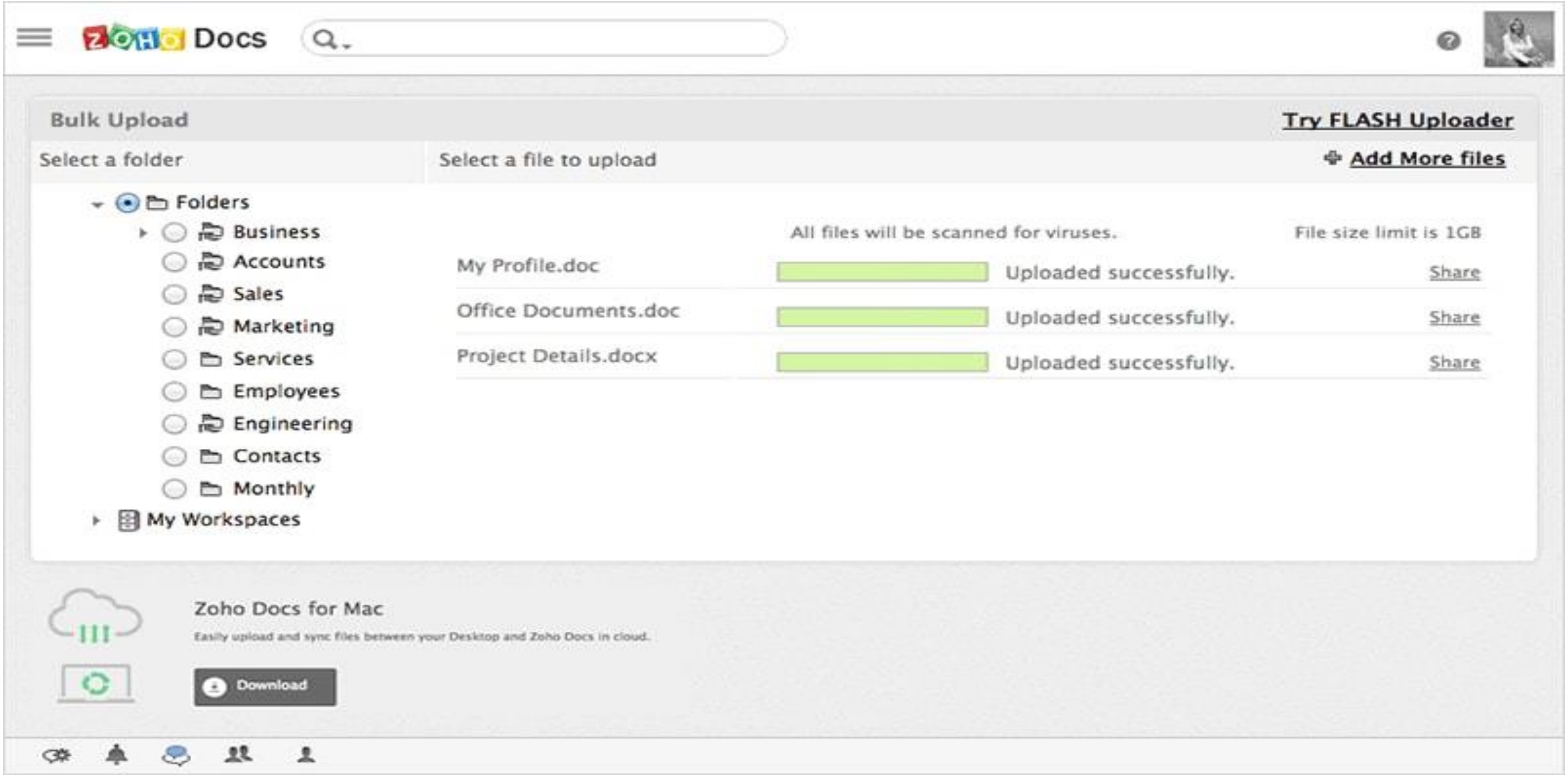
- Record management systems
- Electronic records management systems
- Document management systems
- File management systems
- Document control systems
- Document tracking systems and services
- File storage systems

Each of these denominations has its corresponding acronym, which can be used interchangeably with EDMS (although this is not recommended unless you wish to drive everyone around you crazy.

Examples of EDMS

EDMSs are among the most widely used systems in the world, and software products within this space are easy to find. Some of the most common examples include:

- Zoho Docs
- Logical Doc
- Microsoft SharePoint Online
- M-Files DMS
- Ascensio System Only Office
- Evernote Business
- Google Drive
- Dropbox
- Box
- Microsoft OneDrive
- Egnyte
- eFileCabinet
- DocuWare
- Citrix ShareFile
- Google Cloud Search


Docs
Bulk Upload
Try FLASH Uploader
Select a folder
Select a file to upload
Add More files
Folders
Business
Accounts
Sales
Marketing
Services
Employees
Engineering
Contacts
Monthly
My Workspaces
All files will be scanned for viruses.
File size limit is 1GB
My Profile.doc
Uploaded successfully.
Share
Office Documents.doc
Uploaded successfully.
Share
Project Details.docx
Uploaded successfully.
Share
Zoho Docs for Mac
Easily upload and sync files between your Desktop and Zoho Docs in cloud.
Download

Electronic document management (EDM):

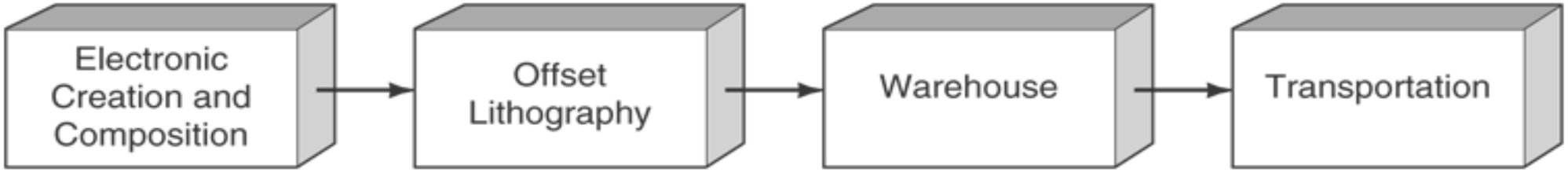
- New technology to manage information resources that do not fit easily into traditional databases.
- EDM addresses organizing and managing conceptual, descriptive, and ambiguous multimedia contents.
- EDM emphasizes electronic documents and their management. Applying emerging technologies to document management is potentially significant.
- EDM improves support and productivity through advancing the management of conceptual information in organizations.
- EDM promises to make a major contribution to business process redesign and quality improvement efforts.

Three sectors where EDM generates business values

- To improve the publishing process.
- To support organizational processes.
- To support communications among people and groups.

Improving the Publishing Process

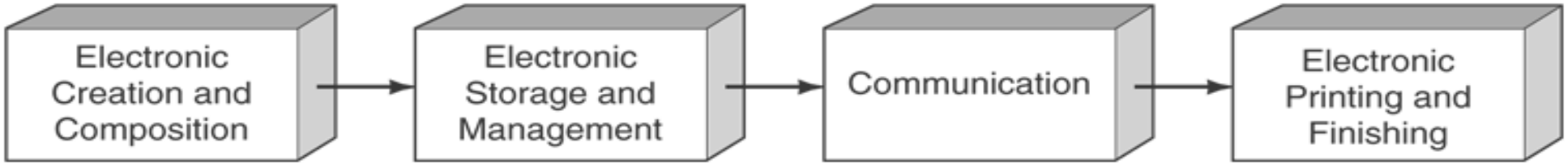
Figure 7.6 Traditional Publishing Process



Inefficiencies in traditional publishing process

- Offset presses are large, expensive, and use toxic chemicals.
- Infrequent long print runs require storing documents, which become obsolete between runs.
- 60% of the total cost is used for storing and transportations.

Figure 7.7 Reengineered Publishing Process



Supporting Organizational Process

- Improve transaction-oriented processing like
  - a claim in an insurance company,
  - hiring a new employee, or
  - making a large expenditure.
- Supports "work-flow systems." This helps in reducing physical space for handling forms, faster routing of forms, and managing and tracking forms flow and workload.
  - Two trends in organization have increased the importance of workflow systems:
    - total quality management; and
    - business process reengineering.
- Improve the management processes of reporting, control, decision making, and problem solving.

Supporting Communications among people and groups

- Even in today's internet world, values of documents cannot be ignored.
  - Some people may not have sufficient internet facilities, some people may not feel comfort with internet transactions.
- EDM can be used to facilitate the documents communications among people and groups across time and space.

Content Management

Web content: corporate documents house paper based PDF form documents, which cannot be changed.

A major reason content has become important to CIOs because it is a core management discipline underlying e-business.

- Without production-level web content management processes and technologies, large-scale e-business is not possible.
- Content is no longer static, it is active. It can cause actions to happen. Content can also be passed to the back-end transaction processing systems and cause an action to take place.

XML

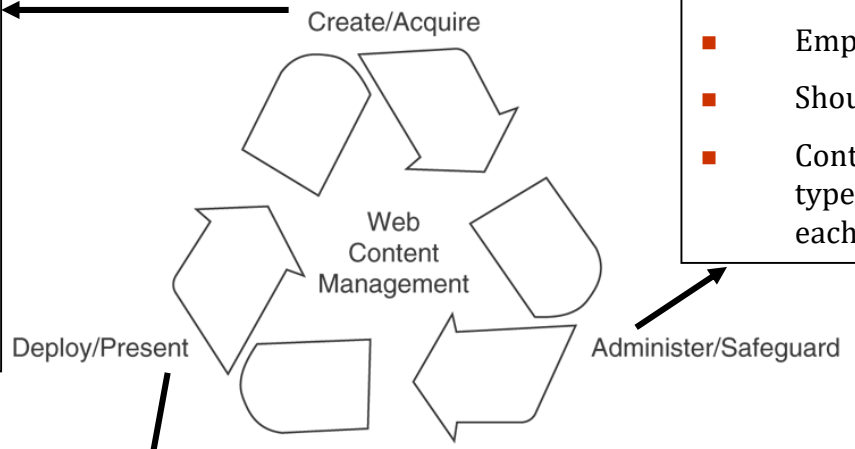
- XML is an intrinsic part of managing web-content because it the language for manipulating the content to work with transaction applications, which is the basis for e-commerce.
- Use of XML moves web-content from being in a human-only readable format to computer readable format.

Managing Content creation and Acquisition

- Syndicated content: for focusing on "*creating content quality,*" rather than creating in house, it is wise to buy from specialists.
- In-house content:
  - best organizational structure is to distribute content creation and maintenance to subject matter experts and local employees.
  - To avoid anarchy, central direction and formats should be maintained.
  - The works should moves based on automatic work-flow systems.
  - visitors feedback should be directed to creators.

Content Management Life Cycle

Figure 7.8 The Web Content Management Life Cycle



Source: Tueber, Chuck, *Dealing in Web Currency,* Gartner EXP, 56 Top Gallant, Stamford, CT; www.gartner.com, June 2001.

Content administration and safeguarding

- Emphasis is given to efficiency.
- Should be centralized.
- Content management tools can be used to identify types of content and the business rule that apply to each type.

Content Deployment and Presentation

- Emphasis is given to Effectiveness. Presenting the contents should
  - attract visitors
  - Allow them to navigate the site easily.
  - leads them to the desired actions.
- Since this phase determines e-commerce success, better to begin from this phase.

Features to attract visitors

- Personalization: The site visitors should have options what they want to see.
- Localization: Local influence such as culture, currency, language etc should used.
- Multi-channel distribution: able to display the site in a manner appropriate to each type of device, from PC to cell-phone.

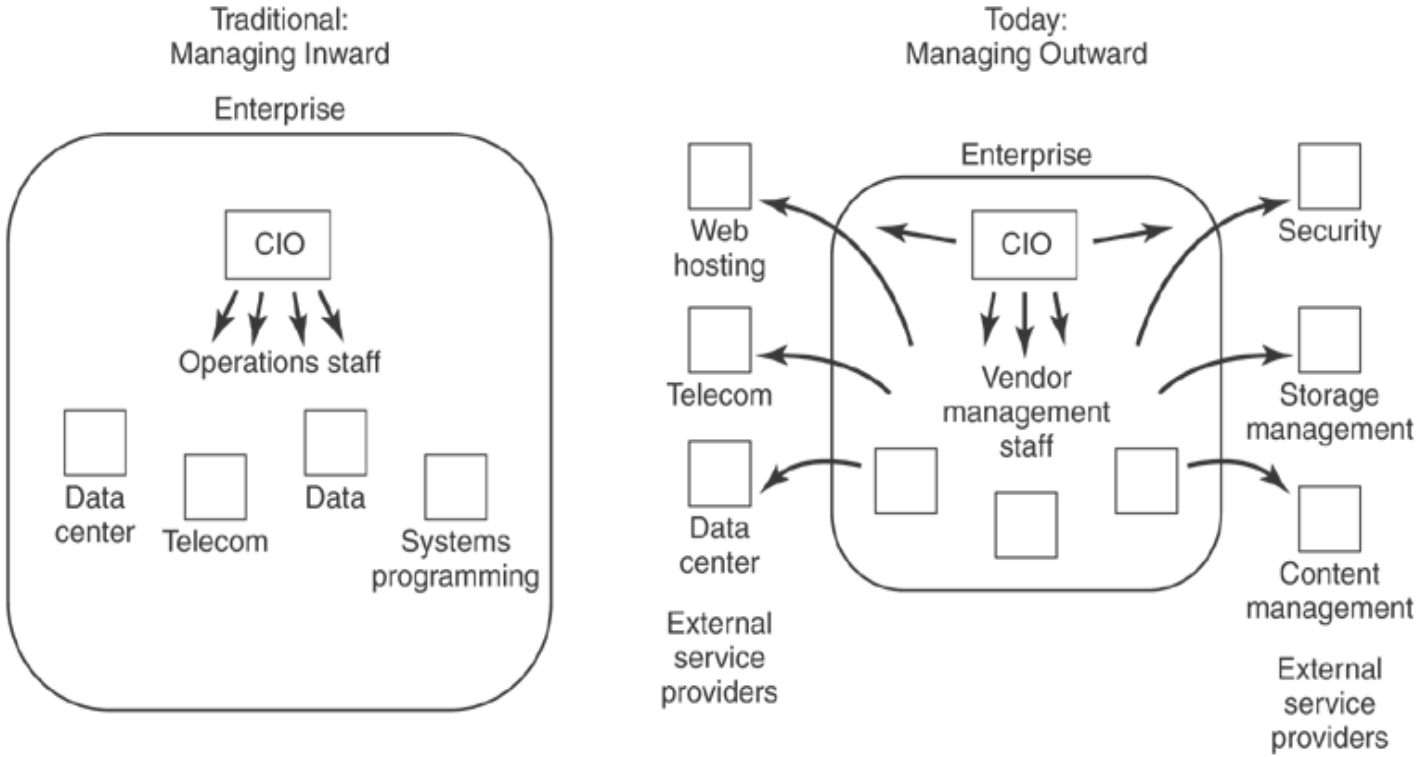
What is operation Management ?

Operation Management of IT department includes

- Hardware and software: hardware includes computer, disk drives, backup drives, printers, communication lines and equipment; software includes operating systems, compilers, and networking software.
- Data center personnel (e.g., systems consulting for developers) and operators who scheduled and run production jobs, performed backups, delivered reports, and monitored the machines and networks.
- managing outsourcing,
- disaster recovery planning and security.

Managing Operations is shifted from inward (managing one's own operating staff) to outward (managing relationships with external service providers)

Figure 8.1 The Shifting Operations Perspective



Operation management Activities

Problems of Operational management,

- Slow response time,
- Networks are down,
- Data isn't available, and
- Data is wrong.

Three strategies to improve operations,

- Buy more equipment.
- Continuously fight fires and rearrange priorities, getting people to solve the problems at hand. (moving poor management from one place to another.)
- Continuously document and measure what you are doing to find out the real problems, not just the apparent ones. Then set standards and manage to them (the preferred solution).

Operational Measures

- External measures: What the customers sees, and related to customers satisfaction.
  - Example: system and network uptime and downtime, response time, program failure, etc.
- Internal measures: are of interest to IS people.
  - Example: computer usage as a percent of capacity, disk storage used, Job queue length, etc.
- Problems reported by external measures can be explained by deviations in internal measures.

Operations: supported by 57% budget of IS department

Importance of Good Management

- The corporate culture created by IS management must recognize and value good management.
- Skills of an operations manager is similar to that needed in a factory.
  - schedule work to meet delivery dates, monitor performance, and response quickly to the problems.
  - Hard to find a good computer operation manager due to absence of prestige, although rewarding both financially and professionally.
- CIO should put the proper operations environment in place, set standards, and then manage those standards by finding an outstanding operations manager.

Operation management Activities

More operations managers are managing outward

- Companies are now turning to third party to manage their data-center and networks.
- CIOs must ensure that their people are properly managing relationships.

Companies have "cleaned their operational house"

- Formerly, companies updated hardware, but rarely updated process.
- Y2k and Internet results in better operational structure because management took the time to define the rules for operations and put better policies and procedures in place.

What's New in Operations?

Operations are being simplified

- Client-server computing techniques are being used to simply operations by centralizing applications in one place rather than distribute them on PCs (programs are downloaded when requested).

Certain operations are being offloaded

- Companies offload the operational aspects of some web based operations, e.g, hosting a real-time event on the web, to third parties that specialize in hosting such activities.

Information System Management

Chapter-07: Managing Partnership-based IT Operations

Lecture-01

Outsourcing IS Functions

Outsourcing means turning over a firm's computer operations, network operations, or other IT functions to providers for a specific time period.

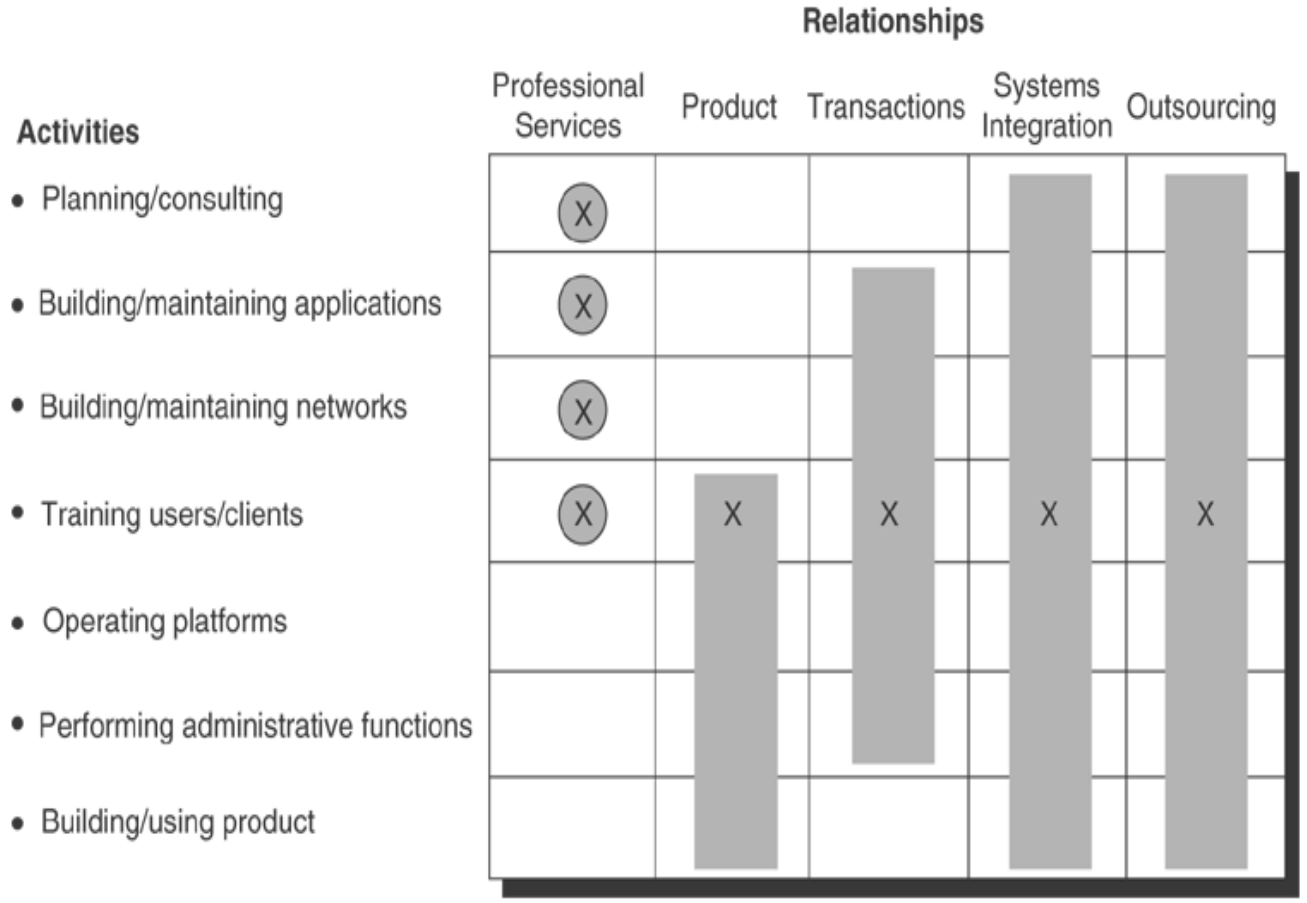
- Outsourcing is not solely an IT issue, but part of driving the focus and value. Because top management must stress value, they must consider outsourcing in all their non-strategic functions.

IS outsourcers perform the same activities for a company that an IS organization performs in-house. Over time, the amount of work done by outsiders has increased.

Traditionally, IS organizations bought professional services, such as planning (or consulting), building or maintaining applications, building or maintaining networks, and training. They also bought products, which may or may not have included training. They also bought transactions, such as payroll check processing from a service bureau or credit reports from a credit rating service. Purchasing transactions allows buyers to shift fixed costs to variable costs and gives sellers higher margins because they take on the risks.

With the high use of packages and the need to integrate them to create integrated systems, companies have contracted with systems integrators. They generally handle the entire life cycle—planning, development, maintenance, and training—for major systems projects. Finally, the most bundled approach to contracting for IT services is outsourcing, where the outsourcer contracts to handle all or most of certain IT activities. The main difference between the latter two options is that systems integration is project based, whereas outsourcing is time based.

Figure 8.2 Customer-Vendor Relationships



Source: Mel Bergstein, DiamondCluster Int'l., Chicago, IL, 1995.

Customer-vendor relationships expanded from buying professional services, to buying products and transactions, to integrate systems, to outsourcing (the most bundled approach to contracting).

This five-option continuum, shown in the Figure, demonstrates how the IT field has moved. As the organization moves from the more traditional professional services category (on the left) to outsourcing (on the right), four changes occur in the vendor–customer relationship:

Four changes observed in customer-vendor relationships:

- IS management/CIO loses an increasing amount of control because more of the activities are turned over to outsiders.
- Providers take on more risks as they offer right portion.
- Providers' margin improve as they offer right services.
- Choosing right provider becomes important.

Outsourcing History

IT Outsourcing (in 1989): Companies outsourced its data center operations to save money and remove huge IT investments (by shifting fixed costs to variable).

Problems: 1. "Us vs. them" mindset: neither the clients nor the outsourcers handled the transition well.

2. Cultures Clashed: Former employees might have kept their same desk, but becomes provider (employee of outsourcer) and treated differently. So, managing relationship was tough job.

Transitional Outsourcing: contacts were made for shorter time and did not include operations.

In 1990-Clients-server computing: Companies chose one of the two routes-

- Outsourced maintenance of legacy systems; while their staff concentrated on building new client-server systems.
- Outsourced the client-server development to specialists and kept maintenance in-house.

In Late 1990 -Y2K problem: Most companies outsourced their enormous volume of Y2K works to India, Ireland and other countries.

Best-of-Breed Outsourcing (mid to late 90s): Although selecting one outsourcer with broad capabilities is easier to manage, no single company "best in class" in all areas. So, selective outsourcing began, where one company handled desktop operations, another data center operations, and a third network management.

- Collaborative outsourcing: Recent trend where one company is the prime contractor and the others are external service providers.

Outsourcing History

Offshore Outsourcing (late 1990s): When labor market was tight due to Y2K, Companies turn to offshore outsourcing to India, Ireland, and Philippines, because labor costs are lower and there is ample supply of educated people.

There are four stages of maturation in offshore outsourcing

1. Offshore bystanders: outsourced domestically only, because they don't have experience to manage geographically dispersed projects.
2. Offshore experimenters: Companies outsourced a project or two offshore at ad-hoc basis.
3. Proactive Cost focus: Companies explicitly develop capabilities and expertise to manage their offshore relationships. Outsourced non-core and structured work like maintaining current systems or testing new systems.
4. Proactive strategic focus: Not just simply a source of low cost labor, but also to develop strategy to spur new innovation, develop new products, and explore new markets.

Shared Services: With the success of outsourcing, to improve efficiency and save money, companies "in-sourced" to themselves and create a center of expertise in each area.

- Shared services centralized the management of outsourced functions, because in many cases, the functions are centralized and then outsourced.
- Shared service groups have become adept at negotiating and managing contracts and supplier relationships because these tasks are a main part of their job.

Outsourcing History

Business Process Outsourcing: Outsourcing all or most of a reengineered process that has a large IT components.

- As outsourcing become matured, it becomes a commodity service, hence
  - competition arose and profit margin drops.

  To move into higher-margin service, External service providers (ESPs) move into business process specific services.

e-Business Outsourcing: Outsourcing the e-Business infrastructure.

Benefits:

1. Allows company to move quickly into the new systems.
2. companies can remain flexible (can stay small and focus on few key functions.)
3. Does not tie up funds in computer and networking equipment, which could become obsolete soon.
4. Rent on "best-of-breed" basis rather than buy.

In 15 years, IT outsourcing has expanded significantly, from outsourcing data center to outsourcing business process.

Managing Outsourcing

Organizational Structure

Managing outsourcing is Different from managing internal staff, because, for one reason, it is a joint effort between parties that may not have the same goals.

Parties establish layers of joint teams

Top-level team: final word in conflict resolution.

Operational team: oversees day-to-day functioning. Have frequent formal meetings.

Special purpose team: created from time to time to solve pressing issues.

Standing committee: oversee the use of formal change management procedures.

Relationship Managers: a single executive from each side to look after the relationship.

Governance

- A service level agreement (SLA) is made to define responsibilities, performances, requirements, penalties, bonuses, etc.
- Metrics is the important part of SLA to make it measurable.
- Trust is the main driving force. If trust breaks down, they turn to the contact.

Managing Outsourcing

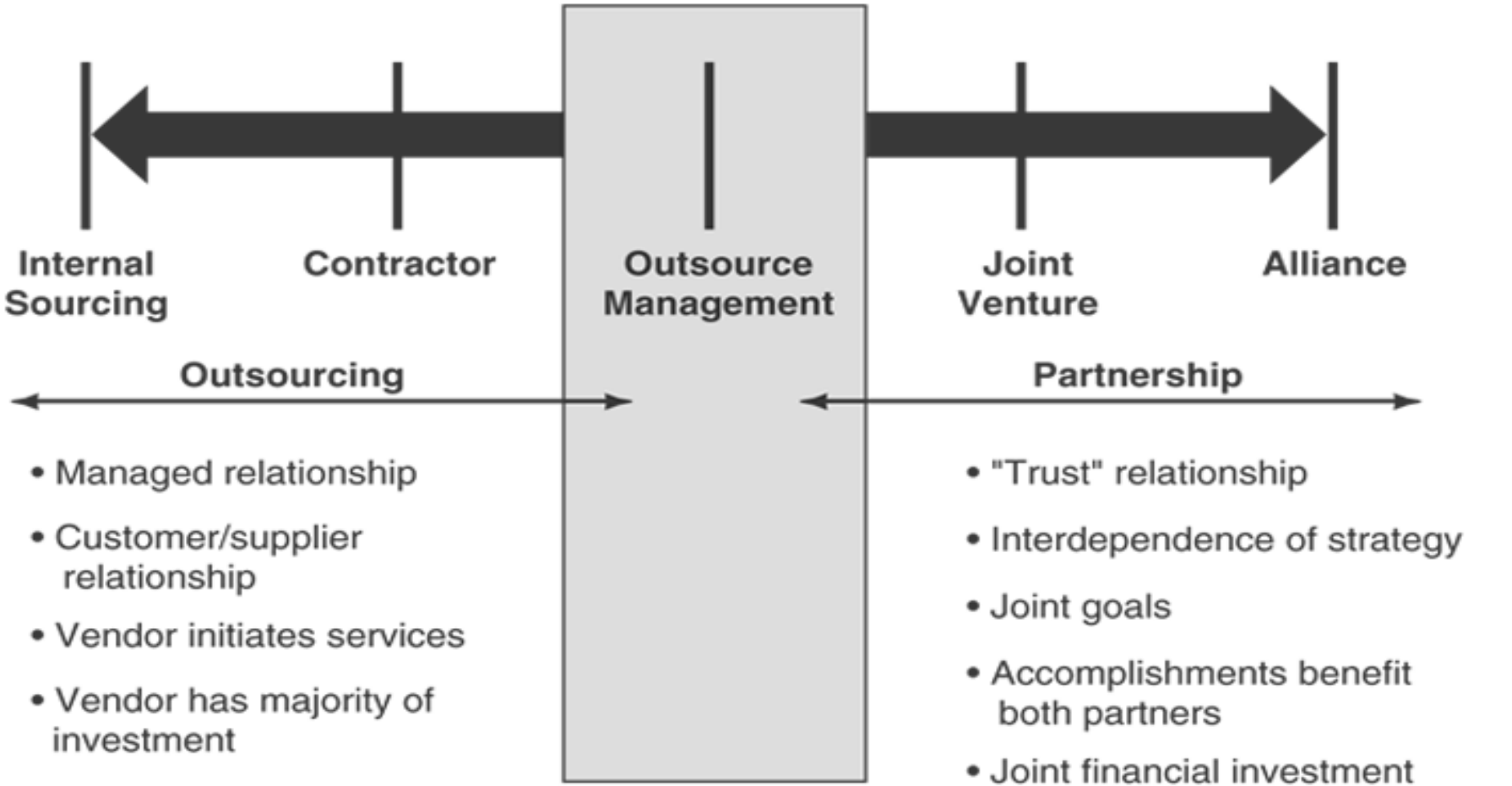
Supplier Development

- Buying parts and services that go into one's own products and services.
- Assisting one's suppliers to improve their products and services by generally improving their process.

Day-to-day working: some Recommendations to day-to-day interactions:

- Manage expectations, not staff: Command-and-control is not a wise option. Facilitation becomes the mode of working.
- Realize that informal way of working should disappear: Relationship should be handled strictly by the book.
- Loss of informal ways of working can add rigor: Think twice before requesting change and prepare better definition of what they want. Better process can streamline work, improve effectiveness, and reduce unnecessary cost.
- Integration of the two staff requires explicit actions: Integration does not happened naturally, requires explicit actions such as inviting meeting, joint celebrations, don't unduly restrict outsourcing staff access, etc.
- The best way to manage day-to-day is to communicate frequently.

Figure 8.3 The Outsourcing Management Spectrum



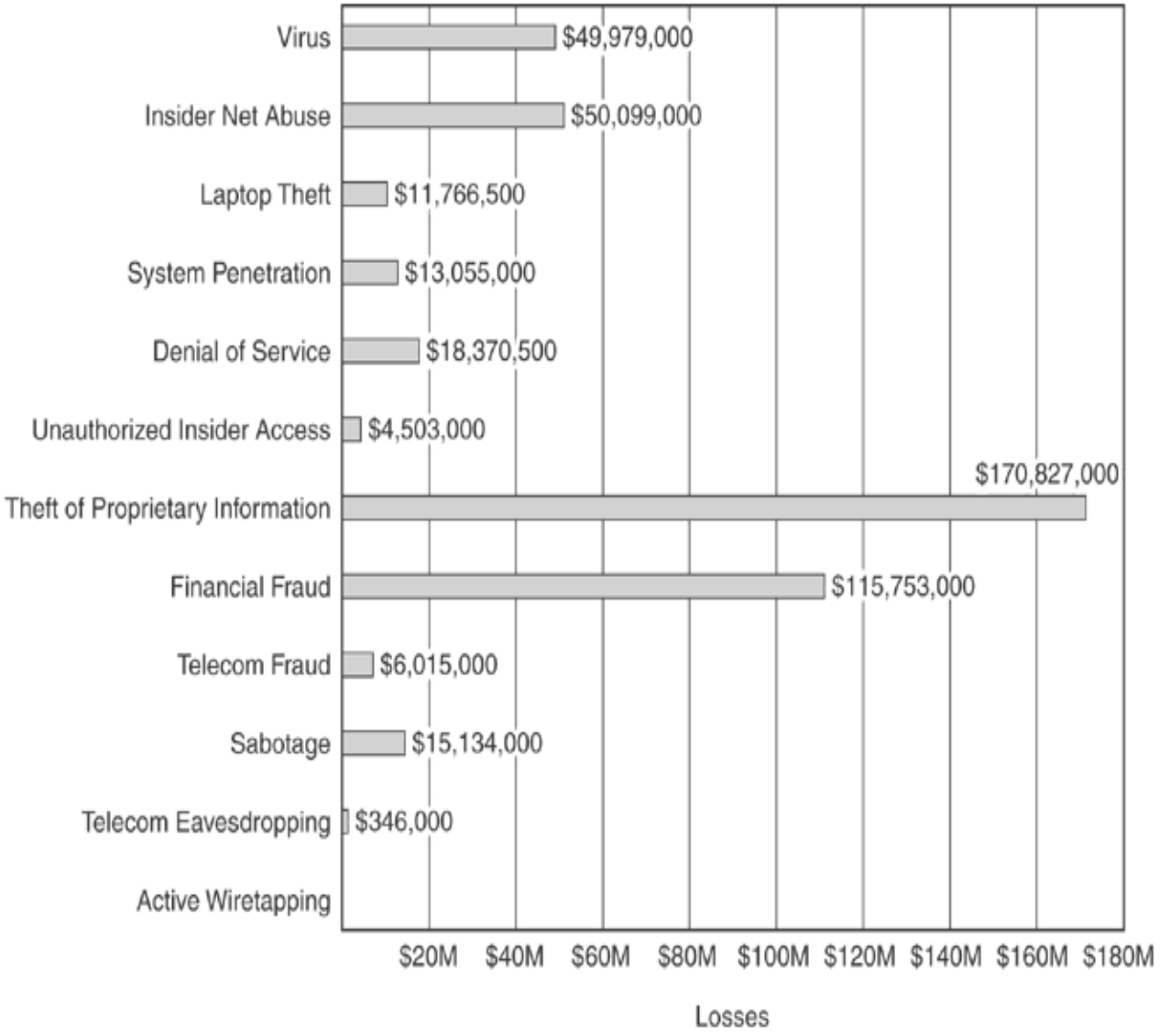
Source: Courtesy of Gartner, Stamford, CT, www.gartner.com.

Information System Management

Chapter-09: Managing Information Security

Lecture-01

Figure 8.6 Dollar Amount of Losses by Type



Source: Reprinted with permission of Computer Security Institute, "2002 CSI/FBI Computer Crime and Security," Computer Security Institute, San Francisco, CA, www.gosci.com, Spring 2002.

Losses due to lack of information security are increases dramatically because

- World becomes connected electronically. World-wide spreading of distributed systems.
- Companies have rushed into e-commerce applications having no built-in security systems.
- Mobile computing and telecommunications also increase the possibility for cyber crime, because greater number of network opening provides more opportunity to illegal entry.
- Cracker community is now "a public club." Cracker tools are now becoming increasingly sophisticated and available in internet.
  - Crackers and security providers are now playing a "cat-and-mouse" game.

RSA Security Inc. a prominent network security firm, and the Security Division of EMC since June 2007, notes that it is easier to guard a bank vault than to guard every house in town. That is why many companies are outsourcing their data-center operations to data-center specialists with vault-like security

RSA describes the following nine approaches hackers use

Cracking the password

- Some people don't use password, some use words, while some use child name, birth date, etc.
- Crackers use software to test out the combinations.

Spoofing

- By masquerading as a legitimate IP address, crackers can gain access to a site and redirect traffic or use secret information (say credit card information) .

Tricking someone

- May call as a service-provider or network administrator and ask for password to solve an immediate problem.

Virus

- These pieces of software run without permission. Their most common entry point has been as e-mail attachments. Once such an attachment is opened, the program is released and performs its task, such as destroying files or replicating itself in e-mails sent to everyone in the e-mail directory.

Network Sniffing

- Most of the network traffics are plain text, rather than encrypted.
- Crackers launch software to monitors all the traffics to find out passwords or important information.

Trojan Horse

- A malicious program(malware) housed inside an innocent program and make damages. By its definition malware is malicious software, so viruses are actually a type of malware.

Denial of service

- This tactic floods a party, such as a Web site, with so much useless traffic that the site becomes overwhelmed and freezes. Legitimate messages are locked out, essentially shutting down the business for a period of time.

Misusing administrative tools

- Helpful tools can be turned against a network.
- Example, a program written to uncover the weak spot in a network by network administrator, which is important for network administrators, has been used by hackers to find weak spots in target companies' networks.

Playing as a middle man

- Placing between two communicating parties, denying one party access to a session, such as denying a competitor access to an important online auction, is another common ploy (commonly used in auction).

Five Pillars for Information Security

1. Authentication: Verifying the authenticity of users by
   - Something they know: password or mother's maiden name.
   - Something they have: Computer generated "Token" or digital signature.
   - Something they are (biometrics): Fingerprints, retinal scan, voiceprint, etc.

   RSA recommends for two-factor authentication.

2. Identifications: Identifying the users to grant them appropriate access.
   - Some people suggest for single-sign system for simplifying identifications burden for each applications.

3. Privacy: Protecting information from being seen.

4. Integrity: Keeping information in its original form.

5. Nonrepudiation: Preventing parties from denying actions they have taken part in a sensitive transaction or communications. Nonrepudiation is a means of providing proof of data transmission or receipt so that the occurrence of a transaction cannot later be refused. Nonrepudiation services can prove that someone was the actual sender and the other the receiver; no imposter was involved on either side..

Identification

Identification is the first step in accessing a gated system, whether the gate is a literal gate or a prompt for information on a computer screen.

In most systems, users are either assigned or choose a username and password combination. As far as an application or software is concerned, that username is how you're identified within the system. If you were at a literal gate identifying yourself to a guard, your identity would be tied to your name. It's how you say "this is me" to a given entity that is asking.

Why does it matter?

Because people and computer systems can be fooled. Data breaches and identity theft make it possible for cybercriminals to pretend to be just about anyone. If they have your username, how is the system supposed to know if it's you, or a bad actor? If someone has called into a call center claiming to be you, how does the support rep know if that person is you or a fraudster?

Authentication or Verification

It's easy to claim an identity. You can call into a support center and claim to be whoever you want. When it comes to digital identities, usernames are often one of the least secure aspects of an identity. You can input any username you like into a system, but you can't gain access unless you also provide a form of authentication. This is what happens when a call center requires you to verify your identity using a street you've lived on, a pin number, or most commonly, a password.

You verify that you are the person who the username is assigned to by providing a secret that only you know: your password or pin number. This process is also referred to as authentication, and passwords are a factor used to authenticate. Other factors can be knowledge-based answers, such as streets you've lived on, pet names, and other security questions you commonly have to answer before resetting your password. More secure factors include biometrics, physical keys, tokens, or randomly generated one-time passwords.

Authentication and verification can be used almost interchangeably in this context, and often are. You are ensuring that a given entity (whether it's a person or a computer connecting on a network) is who they claim to be.

That last point is the main difference between identification and authentication or verification. Identification is the act of presenting your ID or username, while authentication is the act of checking that you are you. If someone is pretending to be you, they should be thwarted by a properly secure or accurate authentication method.

Information Security

Counter measures to security breaking

Firewalls: hardware or software typically implemented on a router that controls access between networks and protect against hacking.

- Used to separate intranet and extranets from the internet so that only employees and authorized business partners can access.
- Implementation:
  - Packet filter: Filter out "illegal" packets where "illegal" is defined by security policy.
  - Proxy Server: acts as intermediary between internet and intranet and have a deeper look than packet filter (slower).
- Without policy management firewall is not effective and treated as stand-alone device.

Encryption: Message can be encrypted before sending over the internet.

Two common encryption methods:

- Secret Key encryption:
  - Data encryption standard (DES) uses same key to code and decode a message. The level of security is a function of key size.
- Public key Encryption:
  - RSA (Rivest, shamir, and Adleman) uses a public key and a private key to encode and decode the messages.

Virtual Private Network (VPN): runs over the IP networks and maintain data security by two ways:

- Tunneling: creates a temporary connection between a remote computer and the CLEC's or ISP's local data center. Blocks access to anyone trying to intercept messages sent over link.
- Encryption: Scrambles the message before it is sent and decodes at the receiving end.

Three ways of using VPN:

- Remote Access VPN: give remote employees a way to access an enterprise intranet by dialing a specific ISP.
- Remote Office VPN: give enterprises a way to create a secure private network with offices. The ISP's VPN equipment encrypts all data.
- Extranet VPN: give enterprises a way to conduct e-business with trading partners.

Internet is not secured because, for one reason, none of the TCP/IP protocols authenticate the communicating parties.

Secure Socket Layer (SSL) used in Internet Communications

- Use public key encryption method to protect sniffing.
- Authenticate users identity by sending digital ID to protect spoofing.

Figure 8.8 Sending an Encrypted Message

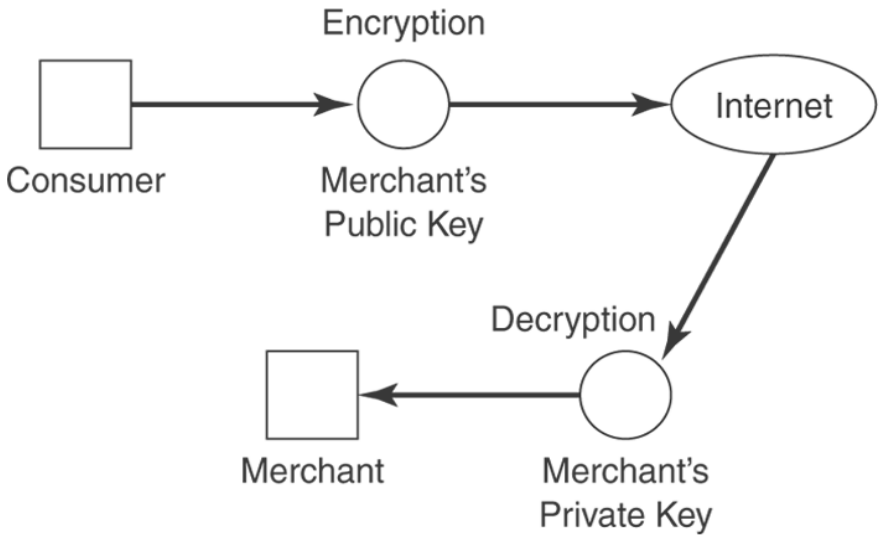


Figure 8.9 Sending a Digital Signature

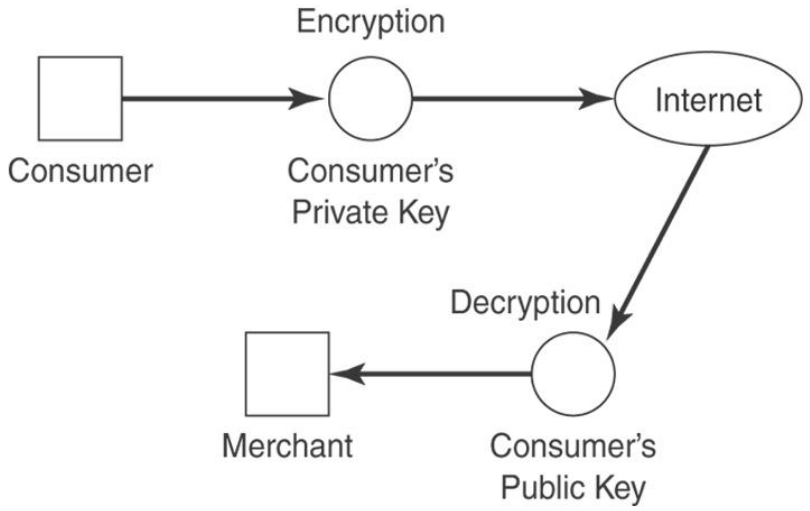
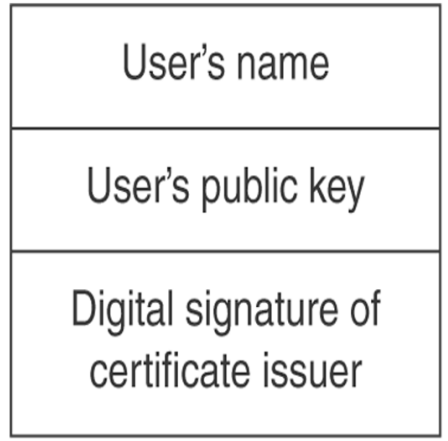


Figure 8.10
A Digital Certificate



Planning for Business Continuity

Business continuity is broader than disaster recovery because it includes

- Safeguarding people during a disaster.
- Documenting business procedures (instead of relying on certain employees who may become unavailable) and
- Giving employees the tools and space to handle personal issues first so that they can then concentrate their work
- Where the work will be done.

Using Internal Resources

Multiple data center: Provide emergency backup for critical services.

Distributed Processing: Critical processing is performed locally rather than at data center. So, uninterrupted during disaster.

- Costly due to data redundancy at central and remote site.

Backup telecommunications facilities: Two ways-

- utilizing duplicate communication facilities.
- using alternative technologies.

LANs: LANs can be used to back up servers of other networks.

Using External Resources

Integrated disaster recovery services

- Recovery sites connected via high speed telecommunications lines can be rented for warehouse space, hosting websites, etc.

Specialized disaster recovery services

- accommodate mainframe clients for backup services.
- Telecommunication firms offer backup services through network reconfiguration (de-route data).

Online and offline data storage: Alternative location for storing data. Two methods to obtain current data 1) computer-to-computer transmission on a scheduled basis 2) dedicated equipment to capture and store data at remote locations.