

Analysis

Determining System Requirements

Prepared by:

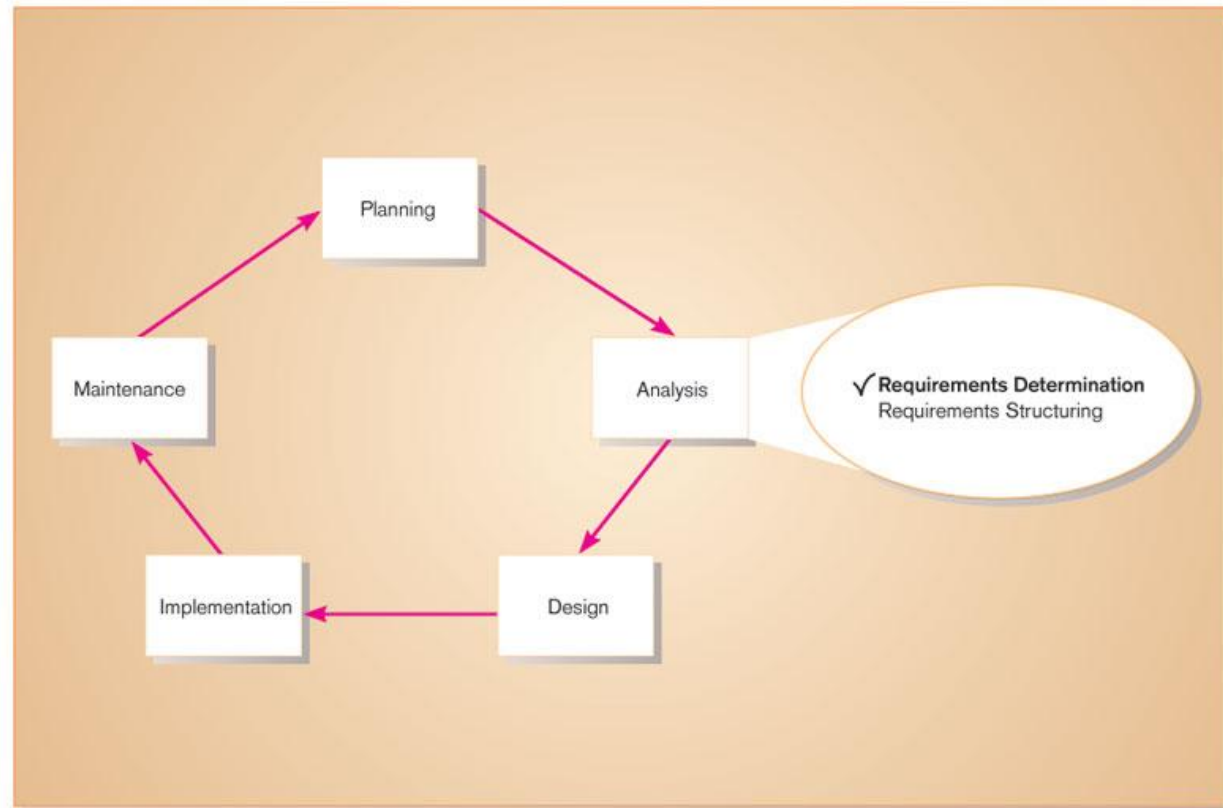
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Performing Requirements Determination

Figure 6-1 Systems development life cycle with analysis phase highlighted



The Process of Determining Requirements

- Systems Analyst Characteristics for Successful Requirements Determination
 - Impertinence (question everything)
 - Impartiality (consider all issues, be not biased)
 - Relaxing constraints (assume anything possible)
 - Attention to details
 - Reframing (challenge yourself for new ways)

Deliverables and Outcomes (Table 6-1)

- Deliverables for Requirements

Determination:

- From interviews and observations - interview transcripts, observation notes, meeting minutes
- From existing written documents - mission and strategy statements, business forms, procedure manuals, job descriptions, training manuals, system documentation, flowcharts

Deliverables and Outcomes (Cont.)

- From computerized sources – Joint Application Design session results, CASE repositories, reports from existing systems, displays and reports from system prototype.

Need to understand the organization

- The business objectives that drive what and how work is done
- The information people need to do their jobs
- The data handled in the organization to support the jobs
- When, how and by whom or what data are moved, transformed and stored
- The rules governing how data are handled and processed

(Cont.)

- The sequence and other dependencies among different data handling activities
- Policies and guidelines that describe the nature of the business and the market and environment in which it operates
- Key events affecting data values and when these events occur

Traditional Methods for Determining Requirements (Table 6-2)

- *Interviewing individuals* informed about the operation and current system and future system needs
- *Interviewing groups* with diverse needs to find synergies and contrasts
- *Observing workers* to see how data are handled and what info needed
- *Studying business documents* to discover issues, policies, rules and use of data within the organization

Interviewing and Listening

- One of the primary ways analysts gather information about an information systems project.
- **Interview Guide** is a document for developing, planning and conducting an interview.

Guidelines for Effective Interviewing (Table 6-3)

- Plan the interview.
 - Prepare interviewee: appointment, priming questions.
 - Prepare agenda, checklist, questions.
- Listen carefully and take notes (tape record if permitted).
- Review notes within 48 hours.
- Be neutral.
- Seek diverse views.

Interviewing and Listening (Cont.)

Figure 6-2 Typical interview guide

Interview Outline	
Interviewee: <i>Name of person being interviewed</i>	Interviewer: <i>Name of person leading interview</i>
Location/Medium: <i>Office, conference room, or phone number</i>	Appointment Date: Start Time: End Time:
Objectives: <i>What data to collect On what to gain agreement What areas to explore</i>	Reminders: <i>Background/experience of interviewee Known opinions of interviewee</i>
Agenda: Introduction Background on Project Overview of Interview Topics to Be Covered Permission to Tape-Record Topic 1 Questions Topic 2 Questions ... Summary of Major Points Questions from Interviewee Closing	Approximate Time: 1 minute 2 minutes 1 minute 5 minutes 7 minutes ... 2 minutes 5 minutes 1 minute
General Observations: <i>Interviewee seemed busy—probably need to call in a few days for follow-up questions since he gave only short answers. PC was turned off—probably not a regular PC user.</i>	
Unresolved Issues, Topics not Covered: <i>He needs to look up sales figures from 1999. He raised the issue of how to handle returned goods, but we did not have time to discuss.</i>	
Interviewee:	Date:
Questions:	Notes:
<p><i>When to ask question, if conditional</i></p> <p>Question: 1 <i>Have you used the current sales tracking system? If so how often?</i></p> <p><i>If yes, go to Question 2</i></p>	<p>Answer: <i>Yes, I ask for a report on my product line weekly.</i></p> <p>Observations: <i>Seemed anxious—may be overestimating usage frequency.</i></p>
<p>Question: 2 <i>What do you like least about the system?</i></p>	<p>Answer: <i>Sales are shown in units, not dollars.</i></p> <p>Observations: <i>System can show sales in dollars, but user does not know this.</i></p>

Choosing Interview Questions

Each question in an interview guide can include both verbal and non-verbal information.

- **Open-ended questions:** questions that have no prespecified answers.

What would you say about the current system you are using?

- **Closed-ended questions:** questions that ask those responding to choose from among a set of specified responses.

Which is more important?

Easy access to the data

Response time

Easy access to the system from remote locations

Interviewing Groups

- Drawbacks to individual interviews
 - Contradictions and inconsistencies between interviewees.
 - Follow-up discussions are time consuming.
 - New interviews may reveal new questions that require additional interviews with those interviewed earlier.

Interviewing Groups (Cont.)

- Interview several key people together
- Advantages
 - More effective use of time.
 - Can hear agreements and disagreements at once.
 - Opportunity for synergies.
- Disadvantages
 - More difficult to schedule than individual interviews.

Nominal Group Technique (NGT)

- A facilitated process that supports idea generation by groups.
- Process
 - Members come together as a group, but initially work separately.
 - Each person writes ideas.
 - Facilitator reads ideas out loud, and they are written on a blackboard or flipchart.

Nominal Group Technique (NGT)

- Group openly discusses the ideas for clarification.
- Ideas are prioritized, combined, selected, reduced.
- NGT exercise used to complement group meetings or as part of JAD effort.

Directly Observing Users

- **Direct Observation**

- Watching users do their jobs
- Obtaining more firsthand and objective measures of employee interaction with information systems.
- Can cause people to change their normal operating behavior.
- Time-consuming and limited time to observe.

Analyzing Procedures and Other Documents

- **Document Analysis**
 - Review of existing business documents
 - Can give a historical and “formal” view of system requirements
- **Types of information to be discovered:**
 - Problems with existing system
 - Opportunity to meet new needs
 - Organizational direction that can influence information system requirements

Analyzing Procedures and Other Documents (Cont.)

- Names of key individuals with an interest in existing systems
- Values of organization or individuals who can help determine priorities
- Special information processing circumstances that occur irregularly
- Reasons for current system design
- Rules and principles for processing data that must be enforced by the information system

Analyzing Procedures and Other Documents (Cont.)

Useful document: Written work procedure

- For an individual or work group.
- Describes how a particular job or task is performed.
- Includes data and information used and created in the process.

Analyzing Procedures and Other Documents (Cont.)

Figure 6-3 Example of a procedure

GUIDE FOR PREPARATION OF INVENTION DISCLOSURE
(See **FACULTY** and **STAFF MANUALS** for detailed
Patent Policy and routing procedures.)

(1) DISCLOSE ONLY ONE INVENTION PER FORM.

(2) PREPARE COMPLETE DISCLOSURE.

The disclosure of your invention is adequate for patent purposes **ONLY** if it enables a person skilled in the art to understand the invention.

(3) CONSIDER THE FOLLOWING IN PREPARING A COMPLETE DISCLOSURE:

- (a) All essential elements of the invention, their relationship to one another, and their mode of operation.
- (b) Equivalents that can be substituted for any elements.
- (c) List of features believed to be new.
- (d) Advantages this invention has over the prior art.
- (e) Whether the invention has been built and/or tested.

(4) PROVIDE APPROPRIATE ADDITIONAL MATERIAL.

Drawings and descriptive material should be provided as needed to clarify the disclosure. Each page of this material must be signed and dated by each inventor and properly witnessed. A copy of any current and/or planned publication relating to the invention should be included.

(4) INDICATE PRIOR KNOWLEDGE AND INFORMATION.

Pertinent publications, patents or previous devices, and related research or engineering activities should be identified.

(5) HAVE DISCLOSURE WITNESSED.

Persons other than coinventors should serve as witnesses and should sign each sheet of the disclosure only after reading and understanding the disclosure.

(7) FORWARD ORIGINAL PLUS ONE COPY (two copies if supported by grant/contract) TO VICE PRESIDENT FOR RESEARCH VIA DEPARTMENT HEAD AND DEAN.

Analyzing Procedures and Other Documents (Cont.)

Potential Problems with Procedure Documents:

- May involve duplication of effort.
- May have missing procedures.
- May be out of date.
- May contradict information obtained through interviews.

These problems illustrate the difference between *formal systems* and *informal systems*.

Analyzing Procedures and Other Documents (Cont.)

- **Formal Systems:** the official way a system works as described in organizational documentation (i.e. work procedure).
- **Informal Systems:** the way a system actually works (i.e. interviews, observations).

Analyzing Procedures and Other Documents (Cont.)

Useful document: Business form

- Used for all types of business functions.
- Explicitly indicate what data flow in and out of a system and data necessary for the system to function.
- Gives crucial information about the nature of the organization.

Analyzing Procedures and Other Documents (Cont.)

Figure 6-4 A blank invoice form

SOFTWARE SELECTIONS, INC.
1234 COMPUTER CT.
ANY TOWN, ANY STATE 54321
(123) 456-7890

INVOICE

TO: _____

SALESPERSON: _____ DATE OF INVOICE: _____

SHIP TO: _____

CUSTOMER ID	SHIPPING METHOD	PAYMENT TERMS	PURCHASE ORDER ID	TAX EXEMPTION ID
QUANTITY	DESCRIPTION	DISCOUNT	UNIT PRICE	AMOUNT
<i>Thank You</i>				
				BALANCE DUE

FORM 17087

Source: <http://www.giraffeonline.com>. Used by permission.

Analyzing Procedures and Other Documents (Cont.)

Useful document: Report

- Primary output of current system.
- Enables you to work backwards from the report to the data needed to generate it.
- **Useful document: Description of current information system**

An example of a report: A consolidated balance sheet

AMAZON.COM, INC. CONSOLIDATED BALANCE SHEETS (in millions, except per share data)		
	December 31,	
	2005	2004
ASSETS		
Current assets:		
Cash and cash equivalents	\$ 1,013	\$ 1,305
Marketable securities	987	476
Cash, cash equivalents, and marketable securities	2,000	1,781
Inventories	566	490
Deferred tax assets, current portion	89	81
Accounts receivable, net and other current assets	274	799
Total current assets	2,929	2,551
Fixed assets, net	548	246
Deferred tax assets, long-term portion	223	283
Goodwill	159	130
Other assets	37	42
Total assets	\$ 3,697	\$ 3,249
LIABILITIES AND STOCKHOLDERS' EQUITY (DEFICIT)		
Current liabilities:		
Accounts payable	\$ 1,266	\$ 1,347
Accrued expenses and other current liabilities	563	479
Total current liabilities	1,829	1,826
Long-term debt and other	1,321	1,855
Commitments and contingencies		
Stockholders' equity (deficit):		
Preferred stock, \$0.01 par value:		
Authorized shares—500		
Issued and outstanding shares—none	—	—
Common stock, \$0.01 par value:		
Authorized shares—5,000		
Issued and outstanding shares—416 and 430 shares	4	4
Additional paid-in capital	2,263	2,125
Accumulated other comprehensive income	6	32
Accumulated deficit	(2,037)	(2,396)
Total stockholders' equity (deficit)	249	(225)
Total liabilities and stockholders' equity (deficit)	\$ 3,697	\$ 3,249

See accompanying notes to consolidated financial statements.

Analyzing Procedures and Other Documents (Cont.)

Table 6-4 Comparison of Observation and Document Analysis

<i>Characteristic</i>	<i>Observation</i>	<i>Document Analysis</i>
Information Richness	High (many channels)	Low (passive) and old
Time Required	Can be extensive	Low to moderate
Expense	Can be high	Low to moderate
Chance for Follow-up and Probing	Good: probing and clarification questions can be asked during or after observation	Limited: probing possible only if original author is available
Confidentiality	Observee is known to interviewer; observee may change behavior when observed	Depends on nature of document; does not change simply by being read
Involvement of Subject	Interviewees may or may not be involved and committed depending on whether they know if they are being observed	None, no clear commitment
Potential Audience	Limited numbers and limited time (snapshot) of each	Potentially biased by which documents were kept or because document not created for this purpose

Contemporary Methods for Determining System Requirements

- **Joint Application Design (JAD)**
 - Brings together key users, managers, and systems analysts.
 - Purpose: collect system requirements simultaneously from key people.
 - Conducted off-site.
- **Group Support Systems**
 - Facilitate sharing of ideas and voicing of opinions about system requirements.

Contemporary Methods for Determining System Requirements (Cont.)

- **CASE tools**

- Used to analyze existing systems.
- Help discover requirements to meet changing business conditions.

- **System prototypes**

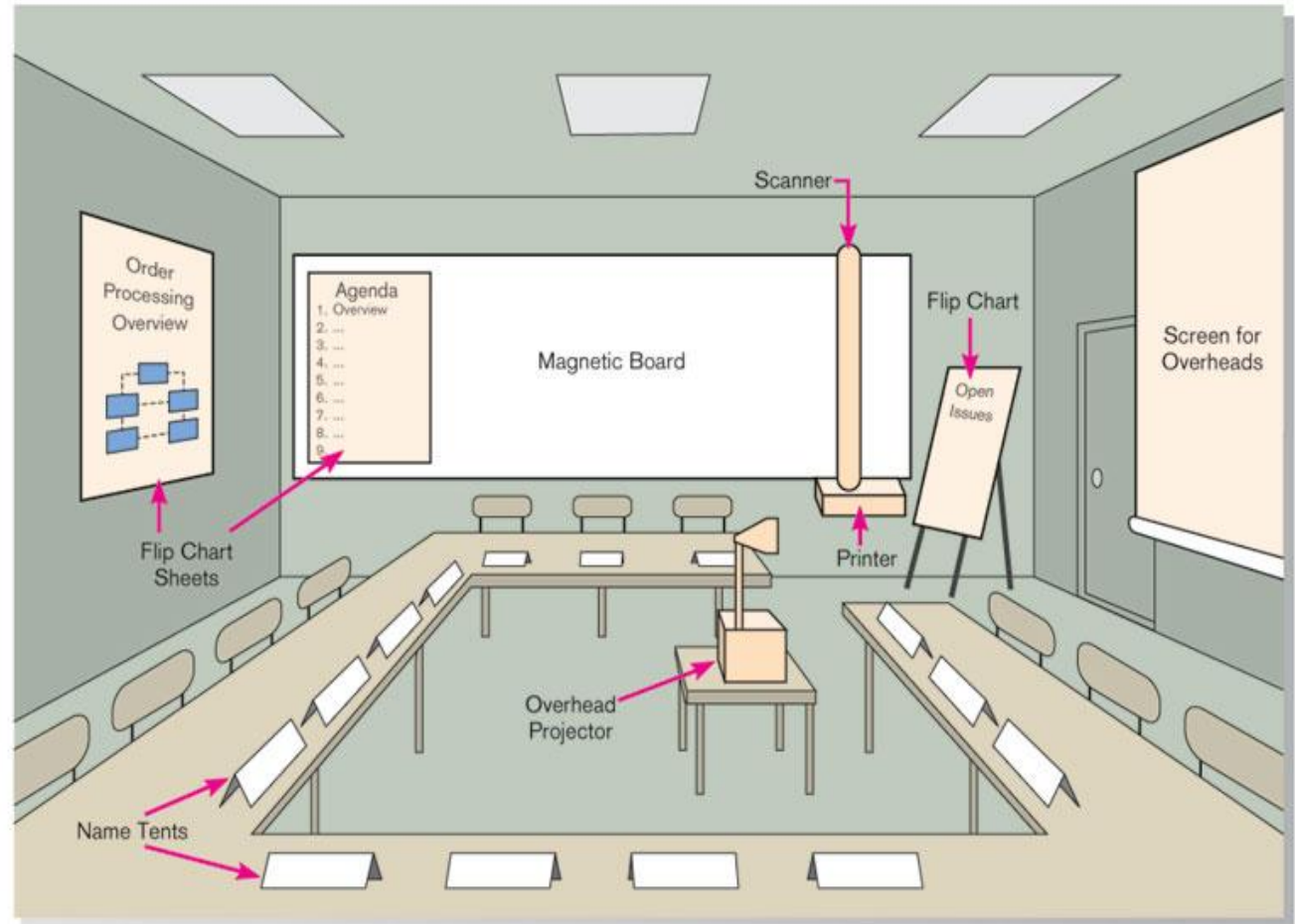
- Iterative development process.
- Rudimentary working version of system is built.
- Refine understanding of system requirements in concrete terms.

Joint Application Design (JAD)

- Intensive group-oriented requirements determination technique.
- Team members meet in isolation for an extended period of time.
- Highly focused.
- Resource intensive.
- Started by IBM in 1970s.

JAD (Cont.)

Figure 6-6 Illustration of the typical room layout for a JAD



Source: Adapted from Wood and Silver, 1995.

JAD (Cont.)

- JAD Participants:
 - **Session Leader:** facilitates group process.
 - **Users:** active, speaking participants
 - **Managers:** active, speaking participants
 - **Sponsor:** high-level in the organization, limited participation.

JAD (Cont.)

- **Systems Analysts:** should mostly listen.
- **Scribe:** record session activities.
- **IS Staff:** should mostly listen.
- **End Result**
 - Documentation detailing existing system.
 - Features of proposed system.

CASE Tools During JAD

- Upper CASE tools are used.
- Enables analysts to enter system models directly into CASE during the JAD session.
- Screen designs and prototyping can be done during JAD and shown to users.

Using Prototyping During Requirements Determination

- Quickly converts requirements to working version of system.
- Once the user sees requirements converted to system, will ask for modifications or will generate additional requests.

Using Prototyping During Requirements Determination (Cont.)

- Most useful when:
 - User requests are not clear.
 - Few users are involved in the system.
 - Designs are complex and require concrete form.
 - History of communication problems between analysts and users.
 - Tools are readily available to build prototype.

Using Prototyping During Requirements Determination (Cont.)

- Drawbacks
 - Tendency to avoid formal documentation.
 - Difficult to adapt to more general user audience.
 - Sharing data with other systems is often not considered.
 - Systems Development Life Cycle (SDLC) checks are often bypassed.

Radical Methods for Determining System Requirements

- **Business Process Reengineering (BPR):** search for, and implementation of radical change in business processes to achieve breakthrough improvements in products and services.

Radical Methods for Determining System Requirements (Cont.)

- Goals
 - Reorganize complete flow of data in major sections of an organization.
 - Eliminate unnecessary steps.
 - Combine steps.
 - Become more responsive to future change.

Identifying Processes to Reengineer

- Identification of processes to reengineer
 - Key business processes
 - Structured, measured set of activities designed to produce specific output for a particular customer or market.
 - Focused on customers and outcome.
 - Same techniques are used as were used for requirements determination.

Disruptive Technologies

- Information technologies must be applied to radically improve business processes.
- **Disruptive technologies:** are technologies that enable the breaking of long-held business rules that inhibit organizations from making radical business changes.

Disruptive Technologies (Cont.)

Table 6-6

Long-Held Organizational Rules That Are Being Eliminated Through Disruptive Technologies

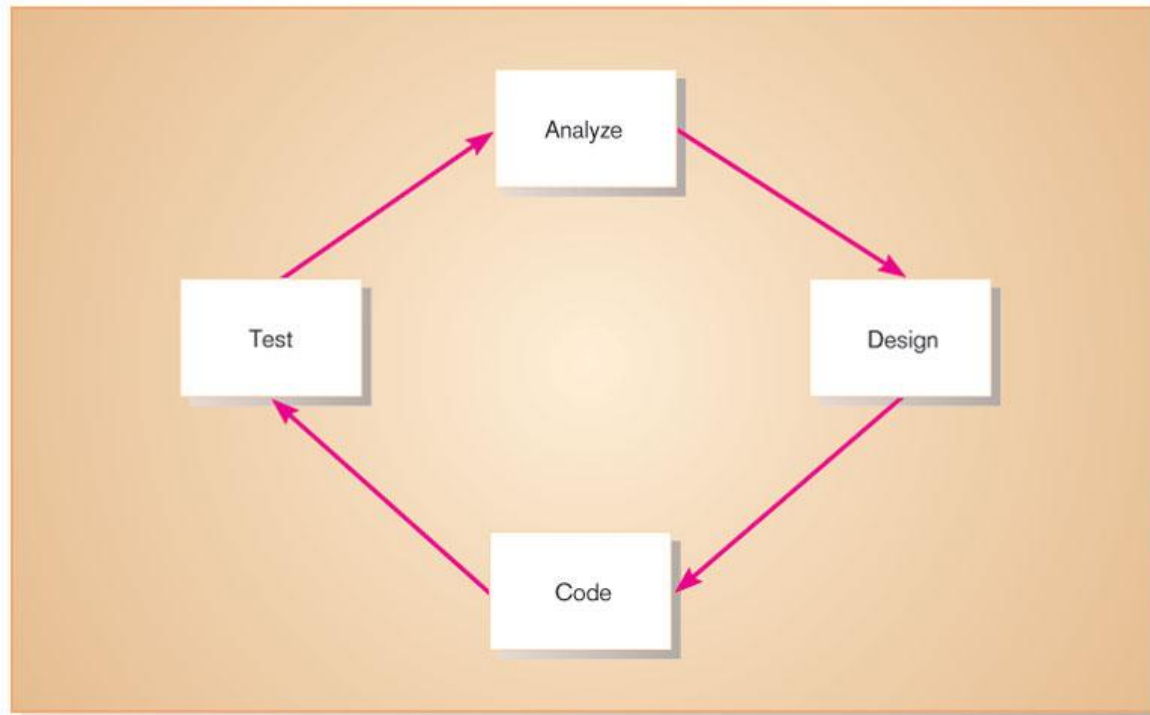
<i>Rule</i>	<i>Disruptive Technology</i>
Information can appear in only one place at a time.	Distributed databases allow the sharing of information.
Only experts can perform complex work.	Expert systems can aid nonexperts.
Businesses must choose between centralization and decentralization.	Advanced telecommunications networks can support dynamic organizational structures.
Managers must make all decisions.	Decision-support tools can aid nonmanagers.
Field personnel need offices where they can receive, store, retrieve, and transmit information.	Wireless data communication and portable computers provide a "virtual" office for workers.
The best contact with a potential buyer is personal contact.	Interactive communication technologies allow complex messaging capabilities.
You have to find out where things are.	Automatic identification and tracking technology knows where things are.
Plans get revised periodically.	High-performance computing can provide real-time updating.

Requirements Determination Techniques using Agile Methodologies

- **Continual user involvement**
 - Replace traditional SDLC waterfall with iterative “analyze – design – code – test” cycle
- **Agile usage-centered design**
 - Focuses on user goals, roles, and tasks
- **The Planning Game**
 - Based on eXtreme programming
 - Exploration, steering, commitment

Continual User Involvement

Figure 6-7 The iterative analysis–design–code–test cycle

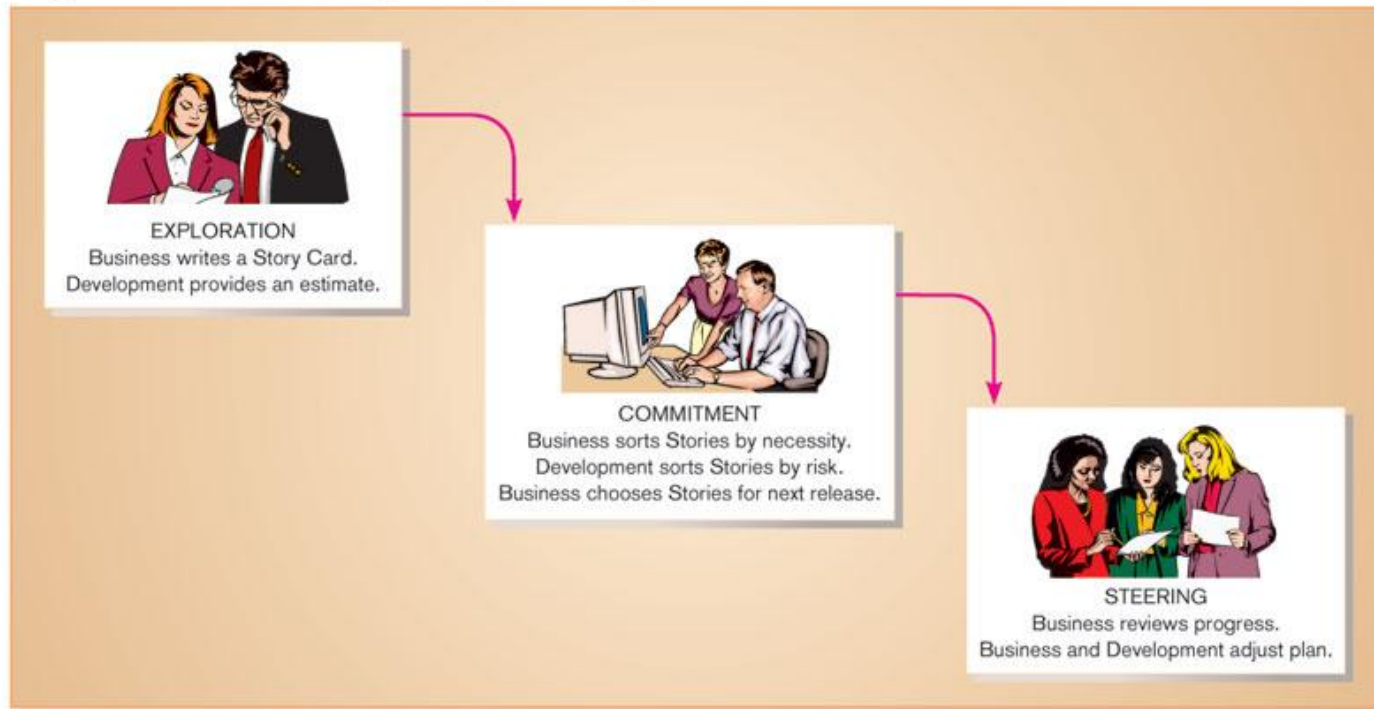


Agile Usage-Centered Design Steps (Table 6-7)

- Gather group of programmers, analysts, users, testers, facilitator.
- Document complaints of current system.
- Determine important user roles.
- Determine, prioritize, and describe tasks for each user role.
- Group similar tasks into interaction contexts.
- Associate each interaction context with a user interface for the system, and prototype the interaction context.
- Step through and modify the prototype.

The Planning Game from eXtreme Programming

Figure 6-8 eXtreme Programming's Planning Game



Review Questions

1. Describe systems analysis and the major activities that occur during this phase of the systems development life cycle.
2. Describe four traditional techniques for collecting information during analysis. When might one be better than another?
3. What is JAD? How is it better than traditional information-gathering techniques? What are its weaknesses?
4. How can NGT be used for requirements determination?
6. How can CASE tools be used to support requirements determination?
7. Which type of CASE tool is appropriate for use during requirements determination?
7. Describe how prototyping can be used during requirements determination. How is it better or worse than traditional methods?
8. When conducting a business process reengineering study, what should you look for when trying to identify a business process to change? Why?
9. What are disruptive technologies and how do they enable organizations to radically change their business processes?