SOOAD

UNIT 1

THE SYSTEM ANALYST AND INFORMATION SYSTEM DEVELOPMENT

The System Analyst and Information Systems

- Introduction
- The System Analyst
- The Software Development Life Cycle & Deliverables
- Project Identification & Initiation

  Feasibility Analysis
- Introduction to Requirements Determination
- Analysis Phase
- Requirements Determination
- Reqirement elicitation techniques

Introduction to Requirements Determination

- Requirements determination is the beginning sub phase of analysis.
- In this sub phase, analysts should gather information on what the system should do from as many sources as possible.
- There are some traditional methods to help collecting system requirements, such as interviewing, survey, directly observing users, etc.
- Nowadays, some modern requirements collecting methods, such as JAD and prototyping, emerged.

Introduction to Requirements Determination

- During the analysis phase, the analyst determines the functional requirements for the new system.
- Output of the analysis phase – primary deliverable, the system proposal.
- Explains the analysis phase of the SDLC.
- Describe the content and purpose of the requirements definition statement.
- Classify requirements correctly as business, user, functional, or non-functional requirements.
- Employ the requirement elicitation techniques of interviews, JAD sessions, questionnaires, document analysis, and observation.

The Analysis Phase

The Analysis Phase

- Term analysis refers to breaking a whole into its parts
- With the intent of understanding the parts' nature, function, and interrelationships.
- The outputs of the planning phase becomes input for the analysis phase.
- It outlines the business goals for the new system, define the project's scope, assess project feasibility, and provide the initial work plan.
- The systems analyst works extensively with the business users of the new system to understand their needs from the new system.

The Analysis Phase

The basic process of analysis involves three steps:

- Understand the existing situation
- Identify improvements.
- Define requirements for the new system

The Analysis Phase

- Sometimes the first step is skipped or done in a limited manner.
- Happens when no current system exists or irrelevant to the future system, or if the project team is using a development methodology in which the as-is system is not emphasized.
- Traditional methods allot significant time to understanding the system.
- Newer methodologies focus almost exclusively on improvements and the to-be system requirements.

The Analysis Phase

- The insights gained from reviewing the existing system can be quite valuable to the project team.
- Analyst needs strong critical thinking skills.
- Ability to recognize strengths and weaknesses and recast an idea in an improved form.
- To understand issues and develop new and improved business processes.
- These skills are essential in examining the results of requirements discovery and translating those requirements into a concept for the new system.

The Analysis Phase

- Number of techniques and tools can be used by the analyst to facilitate this process of discovering requirements.
- The final deliverable of the analysis phase is the system proposal, which compiles
  - the detailed requirements definition statement
  - use cases
  - process models
  - data model
  - revised feasibility analysis
  - work plan.

The Analysis Phase

At the conclusion of the analysis phase, the system proposal is presented to the approval committee

Before moving into the design phase, the project should be reviewed to ensure that it continues to contribute business value to the organization.

The Requirements Determination

The Requirements Determination

- Performed to transform the system request's high-level statement of business requirements into a more detailed, precise list of what the new system must do to provide the needed value to the business.
- This detailed list of requirements is supported, confirmed, and clarified by the other activities of the analysis phase:
  - Creating use cases
  - Building process models
  - Building a data model.

What is a Requirement?

It is simply a statement of what the system must do or what characteristics it needs to have.

Categories of Requirement

- Business (what business needs)
- User (what user needs to)
- Functional (what software would do)
- Non functional (what system will have)
- System (how the system should be built)

Business Requirement

WHAT THE BUSINESS NEEDS??

- Help define the overall goal of the system
- Help clarify the contributions for organization success.
- During the analysis phase, requirements are written from the perspective of business and they focus on what the system needs to do in order to satisfy business user needs.
- Provide the overall direction for the project.
- Ex:
  - Provide product search capabilities,
  - Produce performance reports,
  - provide accurate project status report,
  - Increase market share,
  - Shorten order processing time

User Requirement

WHAT THE SYSTEM NEEDS TO??

- Requirements are written from the perspetive of the business.
- System needs to satisfy the business needs.
- Concentrate on what the user actually needs to accomplish with system.
- Ex:
  - Place a new customer order
  - Re-order inventory
  - Determine available credit
  - Reconcile supplier shipment
- Use cases are tools used to clarify the steps involved in performing the user tasks.

Functional Requirement

WHAT THE SYSTEM NEEDS TO??

- Determining ways in which the new system can support user needs leads to statements of the system's functional requirements.
- Functional requirements begin to define how the system will support the user in completing a task.
- For example,
  - User requirement is "Schedule a client appointment."
  - Functional requirements associated with that task include:
    - "Determine client availability,"
    - "Find available openings matching client availability"
    - "Select desired appointment,"
    - "Record appointment,"
    - "Confirm appointment."

Functional Requirement

- International Institute of Business Analysis (IIBA) defines functional requirements as “the product capabilities, or things that a product must do for its users”.

- Functional requirement may be
  - Process oriented
  - Information oriented

Functional Requirement

- Process Oriented:
  - A process the system must perform
  - Example:
    - The system must allow registered customers to review their own order history for the past three years.
    - The system must check incoming customer orders for inventory availability.
    - The system should allow students to view a course schedule while registering for classes.

Functional Requirement

- Information Oriented:
  - Information the system must contain
  - Example:
    - The system must retain customer order history for three years.
    - The system must include real-time inventory levels at all warehouses.
    - The system must include budgeted and actual sales and expense amounts for current year and three previous years.

System Requirement

HOW THE SYSTEM SHOULD BE BUILD??

- Requirements in the design phase reflect the developer's perspective.
- These requirements focus on describing how to create the software product that will be produced from the project.
- For example,
  - What hardwares would be required?
  - What softwares would be required?
  - What would be the configuration of the system?

Non - Functional Requirement

- The IIBA defines this group of requirements as “the quality attributes, design, and implementation constraints, and external interfaces which a product must have.”
- Used in the design phase when decisions are made about the user interface, the hardware and software, and the system’s underlying architecture.
- Example:
  - The ability to access the system through a mobile device

Non - Functional Requirement

- Describe a variety of system characteristics:
  - Operational
  - Performance
  - Security
  - Cultural and Political

These characteristics do not describe business processes or information, but they are very important in understanding what the final system should be like.

Non - Functional Requirement

Nonfunctional Requirement	Description	Examples
Operational	The physical and technical environments in which the system will operate	■ The system can run on handheld devices. ■ The system should be able to integrate with the existing inventory system. ■ The system should be able to work on any Web browser.
Performance	The speed, capacity, and reliability of the system	■ Any interaction between the user and the system should not exceed 2 seconds. ■ The system downloads new status parameters within 5 minutes of a change. ■ The system should be available for use 24 hours per day, 365 days per year. ■ The system supports 300 simultaneous users from 9–11 A.M.; 150 simultaneous users at all other times.
Security	Who has authorized access to the system under what circumstances	■ Only direct managers can see personnel records of staff. ■ Customers can see their order history only during business hours. ■ The system includes all available safeguards from viruses, worms, Trojan horses, etc.
Cultural and Political	Cultural and political factors and legal requirements that affect the system	■ The system should be able to distinguish between U.S. currency and currency from other nations. ■ Company policy is to buy computers only from Dell. ■ Country managers are permitted to authorize custom user interfaces within their units. ■ Personal information is protected in compliance with the Data Protection Act.

The Process of Determining Requirements

- Both business and IT perspectives are needed to determine requirements during the analysis phase.
- Systems analysts may not understand the true business needs of the users.
- Most effective approach is to have both business people and analysts working together to determine requirements.
- For analysis purpose, one of the first tasks for the analyst is to identify the primary sources of requirements, including the project sponsor, project champion(s), all users of the system (both direct and indirect), and possibly others.
- There are a variety of elicitation techniques that can be used to acquire information, including interviews, questionnaires, observation, joint application development (JAD), and document analysis.

The Process of Determining Requirements

- The analyst works with the entire project team and the business users to verify, change, and complete the list of requirements.
- During this process, use cases, process models, and data models may be used to clarify and define the ideas for the new system.
- Keeping the requirements list tight and focused is a key to project success.

The Requirement Definition Statement

"It is a straight foreward text report that simply lists the functional and nonfunctional requirements in an outline format"

- Purpose:- is to provide a clear statement of what the new system should do in order to achieve the system vision described in the system request.
- But the important purpose of requirement is to define the scope of the system.
- The document describes to the analysts exactly what the final system needs to do.
- If any dispute or misunderstandings arise, the document serves as a resource for clarification.

The Requirement Definition Statement

- Sometimes, requirements are prioritized on the requirements definition statement.
- They can be ranked as having “high,” “medium,” or “low” importance in the new system, or they can be labeled with the version of the system that will address the requirement (e.g., release 1, release 2, release 3).

The most obvious purpose of the requirements definition is to provide a clear statement of what the new system should do in order to achieve the system vision described in the system request.

Requirements Elicitation Techniques

Requirement Elicitation Techniques

Requirements are gathered by System Analyst.

- The best analysts will thoroughly search for requirements using a variety of techniques.
- First, the analyst should recognize that important side effects of the requirements definition process include building political support for the project and establishing trust and rapport between the project team and the ultimate users of the system.
- Second, the analyst should carefully determine who is included in the requirements definition process. This might include managers, employees, staff members,and even some customers and suppliers.
- Finally, do everything possible to respect the time commitment that you are asking the participants to make. The best way to do this is to be fully prepared and to make good use of all the types of requirements elicitation techniques.

Requirement Elicitation Techniques

Five most commonly used requirements elicitation techniques:

- Interviews
- JAD sessions
- Questionnaires
- Document Analysis
- Observation

Interviews

- Most commonly used requirements elicitation technique.
- Interviews are conducted one on one but sometimes, due to time constraints, several people are interviewed at the same time.
- There are five basic steps to the interview process:
  - Selecting interviewees
  - Designing interview questions
  - Preparing for the interview
  - Conducting the interview
  - Post interview follow-up.

Interviews – Selecting Interviewees

- An interview schedule should be created, listing who will be interviewed, the purpose of the interview, and where and when it will take place.
- The schedule can be an informal list that is used to help set up meeting times or a formal list that is incorporated into the work plan.
- The people who appear on the interview schedule are selected on the basis of the analyst's information needs.
- The project sponsor, key business users, and other members of the project team can help the analyst determine who in the organization can bestprovide important information about requirements.
- These people are listed on the interview schedule in the order in which they should be interviewed.

Interviews – Selecting Interviewees

- It is common to begin by interviewing one or two senior managers to get a strategic view and then move to mid-level managers who can provide broad, overarching information about the business process and the expected role of the system being developed.
- Once the analyst has a good understanding of the big picture, lower-level managers and staff members can fill in the exact details of how the process works.
- Like most other things about systems analysis, this is an iterative process—starting with senior managers, moving to midlevel managers, then staff members, back to mid-level managers, and so on, depending upon what information is needed along the way

Interviews – Designing Interview Questions

- There are three types of interview questions:
  - closed-ended questions
  - open-ended questions
  - probing questions.

Interviews – Designing Interview Questions

- Closed ended questions:
  - Closed-ended questions require a specific answer.
  - Similar to multiple choice or arithmetic questions on an exam.
  - Used when the analyst is looking for specific, precise information
  - In general, precise questions are best.
  - For example, rather than asking “Do you handle a lot of requests?” It is better to ask “How many requests do you process per day?”

Closed-ended quesions enable analysts to control the interview and obtain the information they need

Interviews – Designing Interview Questions

- Open ended questions:
  - That leave room for elaboration on the part of the interviewee.
  - Similar in many ways to essay questions that you might find on an exam.
  - Designed to gather rich information and give the interviewee more control over the information that is revealed during the interview.
  - For example: “What do you think about the way the invoices are currently processed?”

Interviews – Designing Interview Questions

- Probing questions:
  - Probing questions follow up on what has just been discussed in order for the interviewer to learn more.
  - Often are used when the interviewer is unclear about an interviewee's answer.
  - They encorage the interviewee to expand on or to confirm information from a previous response, and they are a signal that the interviewer is listening and interested in the topic under discussion.
  - For example: "Why?", "Can you give me an example?"

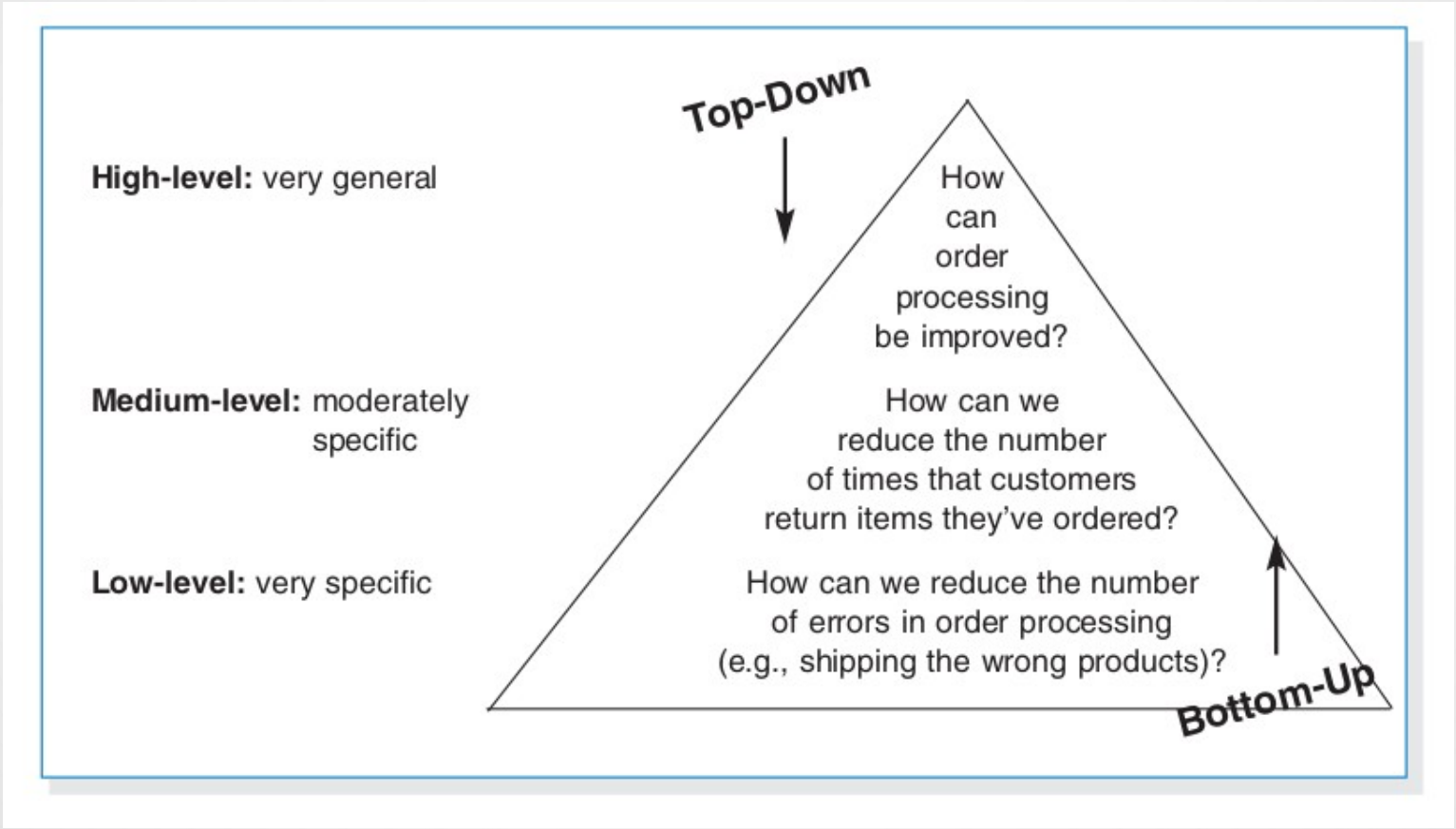
Interviews – Designing Interview Questions

- In general, you should not ask questions about information that is readily available from other sources.
- Your interview questions should anticipate the type of information the interviewee is likely to know.
- No type of question is better than another, and usually a combination of questions is used during an interview.
- As the project progresses, the analyst comes to understand the business process much better, and he or she needs very specific information about how business processes are performed.
- No matter what kind of interview is being conducted, interview questions must be organized into a logical sequence so that the interview flows well.

Interviews – Designing Interview Questions

- There are two fundamental approaches to organizing the interview questions:
  - Top-down
  - Bottom-up
- With the top-down interview, the interviewer starts with broad, general issues and gradually works towards more specific ones.
- With the bottom-up interview, the interviewer starts with very specific questions and moves to broad questions.

Interviews – Designing Interview Questions



Interviews – Designing Interview Questions

- The top-down approach enables the interviewee to become accustomed to the topic before he or she needs to provide specifics.
- It also enables the interviewer to understand the issues before moving to the details, because the interviewer may not have sufficient information at the start of the interview to ask very specific questions.
- Perhaps most importantly, the topdown approach enables the interviewee to raise a set of big-picture issues before becoming enmeshed in details, so the interviewer is less likely to miss important issues.
- One case in which the bottom-up strategy may be preferred is when the analyst already has gathered a lot of information about issues and just needs to fill in some holes with details.

Interviews – Preparing for the Interview

- It is important to prepare for the interview in the same way that you would prepare to give a presentation.
- You should have a general interview plan which lists the questions that you will ask in the appropriate order;
- Confirm the areas in which the interviewee has knowledge so you do not ask questions that he or she cannot answer.
- Review the topic areas, the questions, and the interview plan, and clearly decide which ones have the greatest priority in case you run out of time.
- In general, structured interviews with closed-ended questions take more time to prepare than unstructured interviews.
- When you schedule the interview, inform the interviewee of the reason for the interview and the areas you will be discussing far enough in advance so that he or she has time to think about the issues and organize his or her thoughts

Interviews – Conducting the Interview

- When you start the interview, the first goal is to build rapport with the interviewee.
- You should appear to be professional and an unbiased, independent seeker of information.
- It is critical to carefully record all the information that the interviewee provides.
- One potentially controversial issue is whether or not to tape-record the interview.
- Try to recognize and define jargon, and be sure to clarify jargon you do not understand.
- As the interview progresses, it is important that you understand the issues that are discussed.
- Finally, be sure to separate facts from opinion.

Interviews – Conducting the Interview

- One good strategy to increase your understanding during an interview is to periodically summarize the key points that the interviewee is communicating.
- This avoids misunderstandings and also demonstrates that you are listening.
- As the interview draws to a close, be sure to give the interviewee time to ask questions or provide information that he or she thinks is important but was not part of your interview plan.
- In most cases, the interviewee will have no additional concerns or information, but in some cases this will lead to unanticipated, but important information.

Interviews – Post – Interview Follow up

- After the interview is over, the analyst needs to prepare an interview report that describes the information from the interview.
- The report contains interview notes, information that was collected over the course of the interview and is summarized in a useful format.
- In general, the interview report should be written within 48 hours of the interview, because the longer you wait, the more likely you are to forget information.
- the interview report is sent to the interviewee with a request to read it and inform the analyst of clarifications or updates.

Never distribute someone's information without prior approval.

JAD – Joint Application Development

- Joint application development (or JAD as it is more commonly known) is an information gathering technique that allows the project team, users, and management to work together to identify requirements for the system.
- JAD is a structured process in which 10 to 20 users meet under the direction of a facilitator skilled in JAD techniques.
- The facilitator is a person who sets the meeting agenda and guides the discussion, but does not join in the discussion as a participant.
- He or she does not provide ideas or opinions on the topics under discussion and remains neutral during the session.
- The facilitator must be an expert in both group process techniques and systems analysis and design techniques.

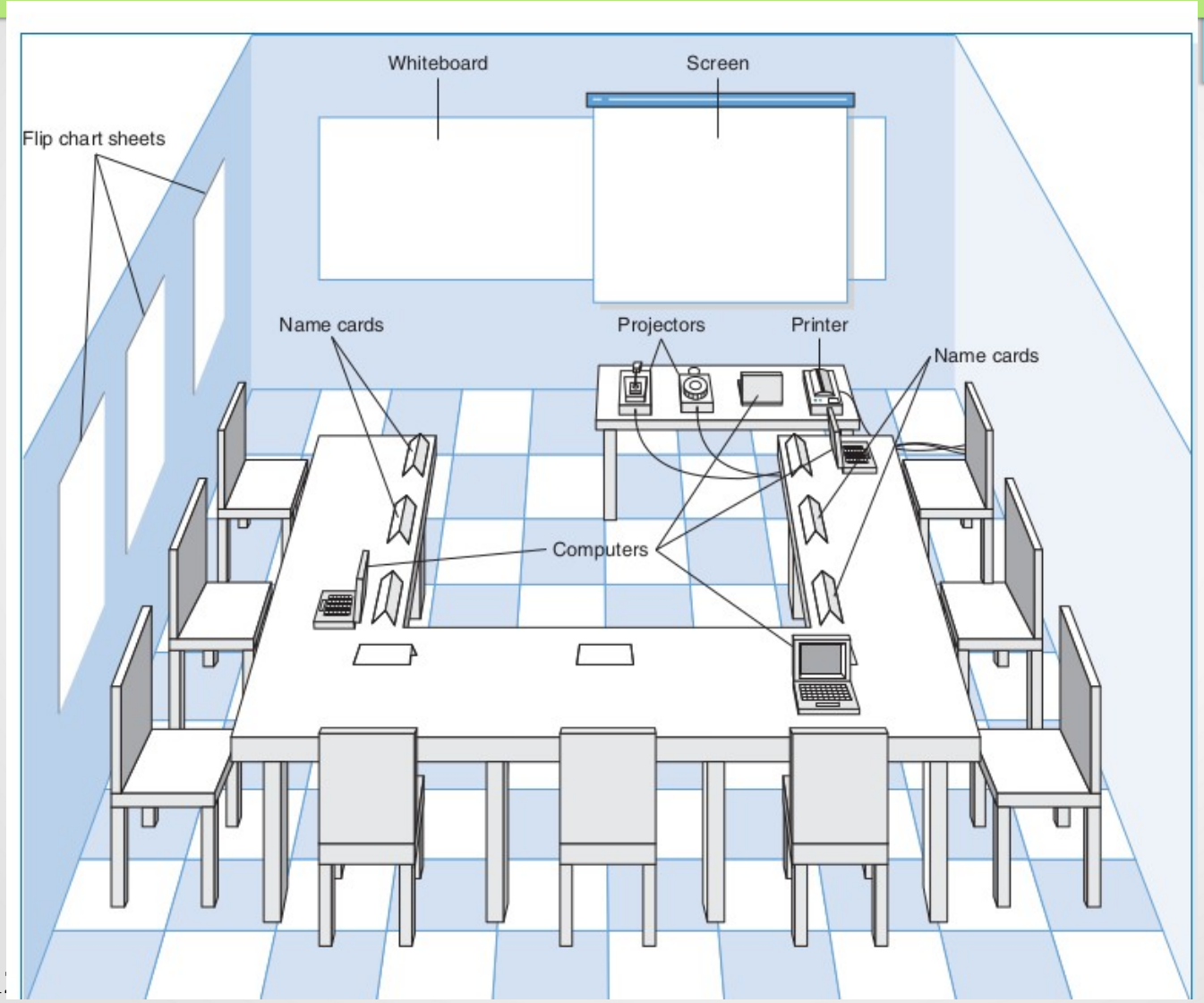
JAD – Joint Application Development

- One or two scribes assist the facilitator by recording notes, making copies, and so on.
- Often, the scribes will use computers and CASE tools to record information as the JAD session proceeds.
- One problem with JAD is that it suffers from the traditional problems associated with groups:
    - Sometimes people are reluctant to challenge the opinions of others,
    - a few people often dominate the discussion, and
    - not everyone participates.

JAD – Joint Application Development

- The JAD group meets for several hours, several days, or several weeks until all of the issues have been discussed and the needed information is collected.
- Most JAD sessions take place in a specially prepared meeting room, away from the participants' offices, so that they are not interrupted.
- The meeting room is usually arranged in a U shape so that all participants can easily see each other.

JAD – Joint Application Development



JAD – Joint Application Development

- In a 15-member group, for example, if everyone participates equally, then each person can talk for only 4 minutes each hour and must listen for the remaining 56 minutes—not a very efficient way to collect information.
- Electronic JAD or e-JAD:
  - In an e-JAD meeting room, each participant uses special software on a networked computer to anonymously submit ideas, view all ideas generated by the group, and rate and rank ideas through voting.
  - The facilitator uses the electronic tools of the e-JAD system to guide the group process, maintaining anonymity and enabling the group to focus on each idea's merits and not the power or rank of the person who contributed the idea.

JAD –Selecting Participants

- Selecting JAD participants is done in the same basic way as selecting interview participants.
- Participants are selected on the basis of information they can contribute, to provide a broad mix of organizational levels, and to build political support for the new system.
- The JAD facilitator is a consultant external to the organization because the organization may not have a regular day-to-day need for JAD or e-JAD expertise.

JAD –Designing the JAD Session

- JAD sessions can run from as little as a half day to several weeks, depending upon the size and scope of the project.
- In our experience, most JAD sessions tend to last 5 to 10 days spread over a 3-week period.
- Most e-JAD sessions tend to last 1 to 4 days in a 1-week period.
- JAD and e-JAD sessions usually move beyond the collection of information into producing analysis deliverables.
- For example, the users and the analysts collectively can create use cases, process models, or the requirements definition.
- A difference between JAD and interviewing is that all JAD sessions are structured—they must be carefully planned.

JAD –Preparing for the JAD Session

- As with interviewing, it is important to prepare the analysts and participants for the JAD session.
- Because the sessions can go beyond the depth of a typical interview and usually are conducted off-site, participants can be more concerned about how to prepare.
- If the goal of the JAD session, for example, is to develop an understanding of the current system, then participants can bring procedure manuals and documents with them.
- If the goal is to identify improvements for a system, then they can think about how they would improve the system prior to the JAD session.

JAD –Conducting for the JAD Session

- Most JAD sessions try to follow a formal agenda, and most have formal ground rules that define appropriate behavior.
- Common ground rules include following
  - the schedule,
  - respecting others' opinions,
  - accepting disagreement, and
  - ensuring that only one person talks at a time.

JAD –Conducting for the JAD Session

- The JAD facilitator performs three key functions.
- First, he or she ensures that the group sticks to the agenda.
- Second, the facilitator must help the group understand the technical terms and jargon that surround the system development process and help the participants understand the specific analysis techniques used.
- Third, the facilitator records the group's input on a public display area, which can be a whiteboard, flip chart, or computer display.

The facilitator must remain neutral at all times and simply help the group through the process

JAD –Conducting for the JAD Session

- It is common for the JAD participants to make use of a number of tools during the JAD session in order to fully define the new system.
- Use cases may be created to describe how the users will interact with the new system.
- Prototypes may be created to more fully understand the user interface or navigation through the system.
- Process models can be constructed to understand the software that will be developed, while a data model can be used to describe the data that will be captured and maintained.

Post JAD Followup

- As with interviews, a JAD post-session report is prepared and circulated among session attendees.
- The post-session report is essentially the same as the interview report.
- Since the JAD sessions are longer and provide more information, it usually takes a week or two after the JAD session before the report is complete.

Questionnaires

- A questionnaire is a set of written questions for obtaining information from individuals.
- Questionnaires often are used when there is a large number of people from whom information and opinions are needed.
- In our experience, questionnaires are commonly used for systems intended for use outside of the organization (e.g., by customers or vendors) or for systems with business users spread across many geographic locations.
- Most people automatically think of paper when they think of questionnaires, but today more questionnaires are being distributed in electronic form, either via e-mail or on the Web.
- Electronic distribution can save a significant amount of money, compared with distributing paper questionnaires.

Questionnaires – Selecting Participants

- As with interviews and JAD sessions, the first step is to select the individuals to whom the questionnaire will be sent.
- It is not usual to select every person who could provide useful information.
- The standard approach is to select a sample, or subset, of people who are representative of the entire group.
- The important point in selecting a sample, however, is to realize that not everyone who receives a questionnaire will actually complete it.
- On average, only 30%–50% of paper and e-mail questionnaires are returned.
- Response rates for Web-based questionnaires tend to be significantly lower (often, only 5%–30%).

Questionnaires – Designing the Questionnaire

- Developing good questions is critical for questionnaires because the information on a questionnaire cannot be immediately clarified for a confused respondent.
- Questions on questionnaires must be very clearly written and must leave little room for misunderstanding; therefore, closed-ended questions tend to be most commonly used.
- Questions must enable the analyst to clearly separate facts from opinions.
- Questions should be relatively consistent in style so that the respondent does not have to read instructions for each question before answering it.
- Some experts suggest that questionnaires should start with questions important to respondents, so that the questionnaire immediately grabs their interest and induces them to answer it.

Questionnaires – Administrating the Questionnaire

- The key issue in administering the questionnaire is getting participants to complete the questionnaire and send it back.
- Commonly used techniques include
  - clearly explaining why the questionnaire is being conducted
  - why the respondent has been selected;
  - stating a date by which the questionnaire is to be returned;
  - offering an inducement to complete the questionnaire
  - offering to supply a summary of the questionnaire responses.

Questionnaires – Questionnaire Followup

- It is helpful to process the returned questionnaires and develop a questionnaire report soon after the questionnaire deadline.
- This ensures that the analysis process proceeds in a timely fashion and that respondents who requested copies of the results receive them promptly.

Document Analysis

- Project teams often use document analysis to understand the as-is system.
- Unfortunately, most systems are not well documented, because project teams fail to document their projects along the way, and when the projects are over, there is no time to go back and document.
- Therefore, there may not be much technical documentation about the current system available, or it may not contain updated information about recent system changes.
- There are many helpful documents that do exist in the organization: paper reports, memorandums, policy manuals, user training manuals, organization charts, and forms.

Document Analysis

- Problem reports filed by the system users can be another rich source of information about issues with the existing system.
- The most powerful indication that the system needs to be changed is when users create their own forms or add additional information to existing ones.
- Such changes clearly demonstrate the need for improvements to existing systems.
- Thus,it is useful to review both blank and completed forms to identify these deviations.

Observations

- Observation, the act of watching processes being performed.
- a powerful tool to gain insight into the as-is system.
- Observation enables the analyst to see the reality of a situation, rather than listening to others describe it in interviews or JAD sessions.
- Observation is a good way to check the validity of information gathered from other sources such as interviews and questionnaires.
- Observation is often used to supplement interview information.