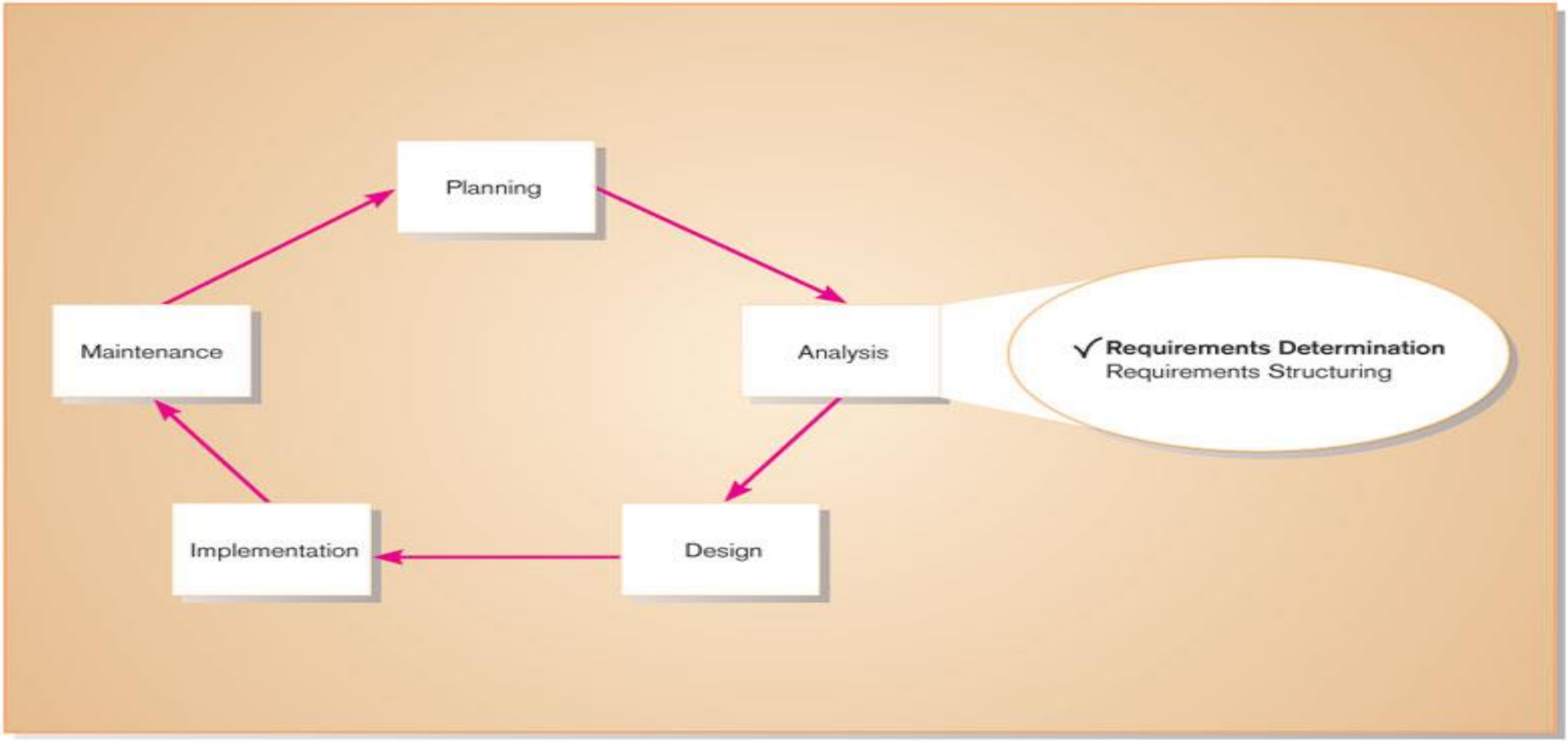
System Analysis and Design

Unit 4
System Analysis

4.1 Determining System Requirements

Performing Requirements Determination

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



Performing Requirements Determination

- **Gather information on what system should do from many sources**
  - **Users**
  - **Reports**
  - **Forms**
  - **Procedures**

Performing Requirements Determination

- Characteristics for gathering requirements
  - Impertinence
    - Question everything
  - Impartiality
    - Find the best organizational solution
  - Relaxation of constraints, assume anything is possible
  - Attention to detail, every fact must fit with every other fact
  - Reframing
    - View the organization in new ways,

Deliverables and Outcomes

- **Types of deliverables:**
  - From interviews and observations - interview transcript observation notes, meeting minutes
  - From existing written documents - mission and strategy statements, business forms, procedure manuals, job descriptions, training manuals, system documentation, flowcharts
  - From computerized sources – Joint Application Design session results, CASE repositories, reports from existing systems, displays and reports from system prototype.

Deliverables and Outcomes

- **Types of deliverables:**
  - **Information collected from users**
  - **Existing documents and files**
  - **Computer-based information**
  - **Understanding of organizational components**
    - **Business objective**
    - **Information needs**
    - **Rules of data processing**
    - **Key events**

Traditional Methods for Determining Requirements

- **1. INTERVIEW**
  - Gather facts, opinions and speculations
  - Observe body language and emotions
  - Guidelines
    - Plan
      - Checklist
      - Appointment
    - Be neutral
    - Listen
    - Seek a diverse view

Traditional Methods for Determining Requirements

- Interviewing (Continued)
  - Interview Questions
    - Open-Ended
      - No pre-specified answers
    - Close-Ended
      - Respondent is asked to choose from a set of specified responses
  - Additional Guidelines
    - Do not phrase questions in ways that imply a wrong or right answer
    - Listen very carefully to what is being said
    - Type up notes within 48 hours
    - Do not set expectations about the new system

Traditional Methods for Determining Requirements

- **Interviewing Groups**
  - Advantages
    - More effective use of time
    - Enables people to hear opinions of others and to agree or disagree
  - Disadvantages
    - Difficulty in scheduling

Traditional Methods for Determining Requirements

- **Interviewing Groups**

- **Nominal Group Technique (NGT)** A facilitated process that supports idea generation by groups.
- At the beginning of the process, group members work alone to generate ideas.
- The ideas are then pooled under the guidance of a trained facilitator.

Traditional Methods for Determining Requirements

- **Nominal Group Technique (NGT)** 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.
  - Group openly discusses the ideas for clarification.
  - Ideas are prioritized, combined, selected, reduced.

Traditional Methods for Determining Requirements

2. Questionnaires

- More cost-effective than interviews
- Choosing respondents
  - Should be representative of all users
  - Types of samples
    - Convenient, local site.
    - Random sample
    - Purposeful sample, people who satisfy certain criteria.
    - Stratified sample, random set of people from many hierarchical levels.

Traditional Methods for Determining Requirements

- **Questionnaires**
  - Design
    - Mostly closed-ended questions
    - Can be administered over the phone or in person
  - Questionnaires Vs. Interviews
    - Interviews cost more but yield more information
    - Questionnaires are more cost-effective

Traditional Methods for Determining Requirements

3. Directly Observing Users

- 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.

Traditional Methods for Determining Requirements

4. Analyzing Procedures and Other Documents

- **Four types of useful documents to SA:**
  - **a. Written work procedures**
    - 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
  - **b. Business form**
    - Explicitly indicate data flow in or out of a system
  - **c. Report generated by current systems**
    - Enables the analyst to work backwards from the report to the data that generated it
  - **d. Description of current information system, how they were designed and how they work**

Analyzing Procedures and Other Documents

- **Types of information to be discovered when analyzing a document:**
  - **Problems with existing system**
  - **Opportunity to meet new need**
  - **Organizational direction**
  - **Names of key individuals**
  - **Values of organization**
  - **Special information processing circumstances**
  - **Reasons for current system design**
  - **Rules for processing data**

Analyzing Procedures and Other Documents

What can the analysis of documents tell about the requirements for a new system?

- **Problems** with existing systems (e.g., missing information or redundant steps)
- **Opportunities** to meet new needs if only certain information or information processing were available (e.g., analysis of sales based on customer type)
- Organizational **direction** that can influence information system requirements (e.g., trying to link customers and suppliers more closely to the organization)
- **Titles and names** of key individuals who have an interest in relevant existing systems (e.g., the name of a sales manager who led a study of the buying behavior of key customers)
- **Values** of the organization or individuals who can help determine priorities for different capabilities desired by different users (e.g., maintaining market share even if it means lower short-term profits)

Analyzing Procedures and Other Documents

What can the analysis of documents tell about the requirements for a new system?

- **Special information** processing circumstances that occur irregularly that may not be identified by any other requirements determination technique (e.g., special handling needed for a few large-volume customers that requires use of customized customer ordering procedures)
- **The reason** why current systems are designed as they are, which can suggest features left out of current software, which may now be feasible and more desirable (e.g., data about a customer's purchase of competitors' products were not available when the current system was designed; these data are now available from several sources)
- **Data, rules** for processing data, and principles by which the organization operates that must be enforced by the information system (e.g., each customer is assigned exactly one sales department staff member as a primary contact if the customer has any questions)

Analyzing Procedures and Other Documents

Problems with Analyzing Procedures and Documents

a. Duplication of effort in two or more jobs.

- Call such duplication to the attention of management as an issue to be resolved before system design can proceed.
- it may be necessary to redesign the organization before the redesign of an information system can achieve its full benefits.

b. The procedure is missing.

- Again, it is not your job to create a document for a missing procedure—that is up to management.

Analyzing Procedures and Other Documents

Problems with Analyzing Procedures and Documents

c. Procedure is out of date.

- You may realize the procedure is out of date when you interview the person responsible for performing the task described in the procedure.
- Once again, the decision to rewrite the procedure so that it matches reality is made by management, but you may make suggestions based upon your understanding of the organization.

d. Contradiction with information collected from other sources

- Formal procedures may contradict information you collected from interviews and observation about how the organization operates and what information is required.
- As in the other cases, resolution rests with management.

Formal and Informal system

- **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).

Modern Methods for Determining Requirements

- **Joint Application Design (JAD)**
  - Brings together key users, managers and systems analysts
  - **Purpose:** collect system requirements simultaneously from key people
  - Conducted off-site

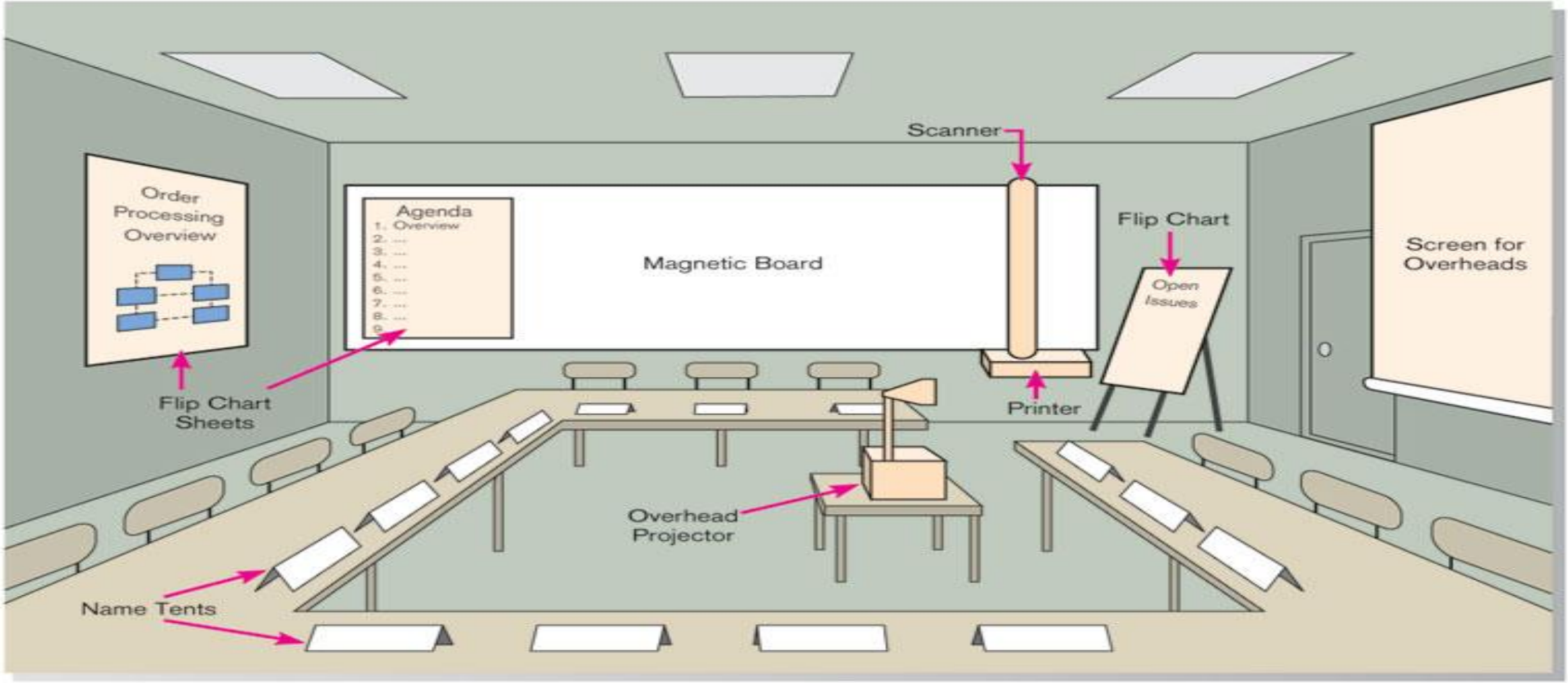
- **Prototyping**
  - Repetitive process
  - Basic version of system is built
  - Refine understanding of system requirements in concrete terms.
  - Goal: to develop concrete specifications for ultimate system

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

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



Source: Adapted from Wood and Silver, 1995.

JAD

Participants of JAD

- **Session Leader**: facilitates group process.
- **Users:** active, speaking participants
- **Managers**: active, speaking participants
- **Sponsor**: high-level champion, limited participation.
- **Systems Analysts**: should mostly listen.
- **Scribe**: record session activities.
- **IS Staff**: should mostly listen.

JAD

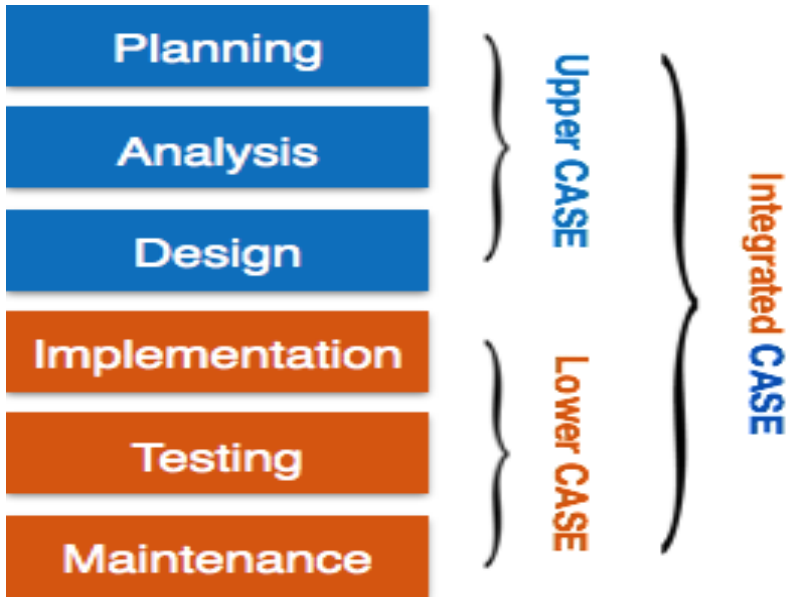
End Results of JAD

- Documentation detailing existing system.
- Features of proposed system.

Joint Application Design (JAD)

CASE Tools During JAD

- Upper CASE tools are used



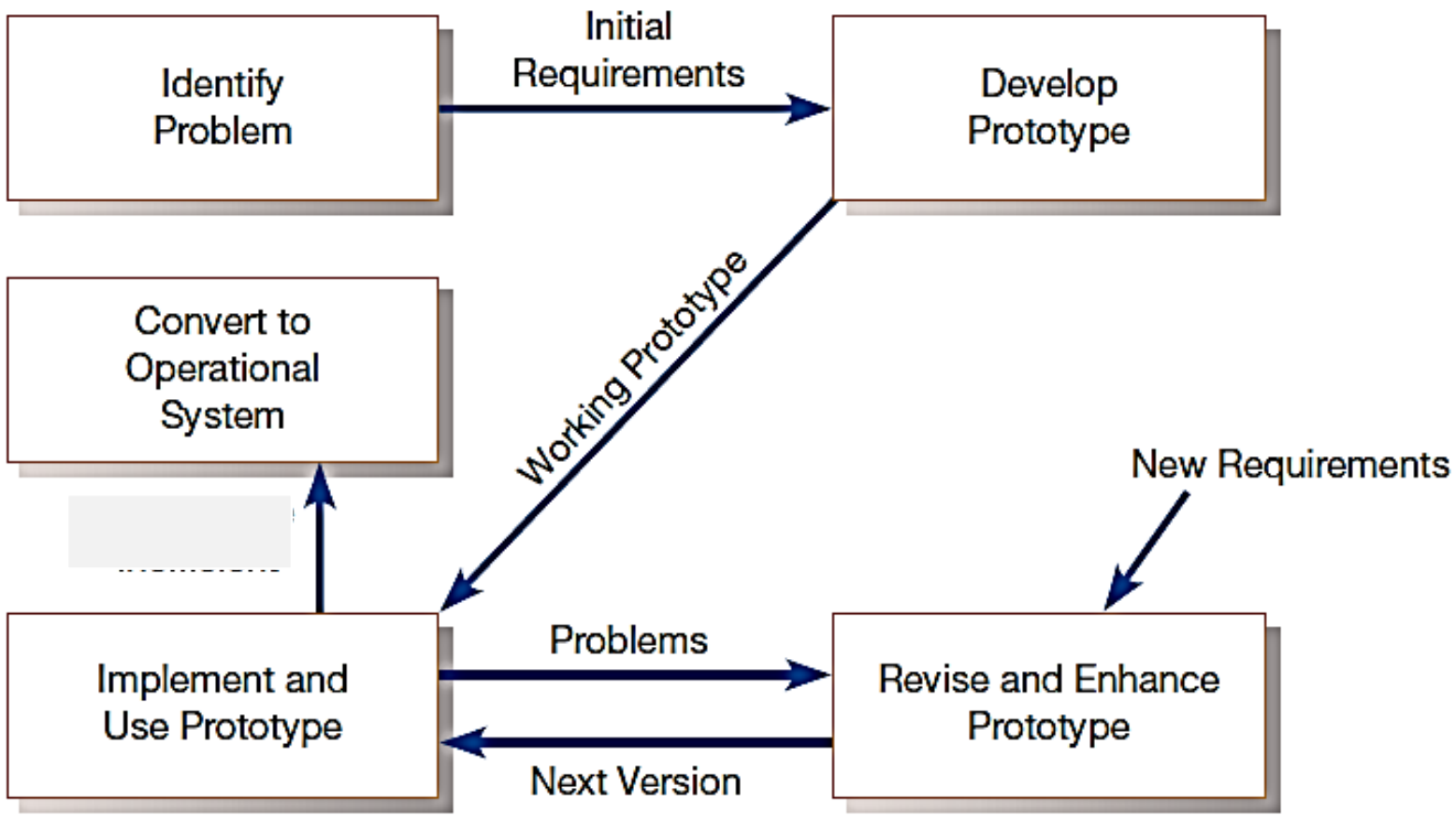
- Enables analysts to enter system models directly into CASE during the JAD session
- Screen designs and prototyping can be done during JAD and shown to users

Joint Application Design (JAD)

- **Supporting JAD with GSS**
  - **Group support systems (GSS) can be used to enable more participation by group members in JAD**
  - **Facilitate sharing of ideas and voicing of opinions about system requirements.**
  - **Members type their answers into the computer**
  - **All members of the group see what other members have been typing**

Prototyping

- 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.



Prototyping

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

Prototyping

- **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**

Business Process Reengineering (BPR)

- Search for and implementation of radical change in business processes to achieve breakthrough improvements in products and services

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

Business Process Reengineering (BPR)

- **Identification of processes to Reengineer**
  - **Key business processes**
    - **Set of activities designed to produce specific output for a particular customer or market**
    - **Focused on customers and outcome**
    - **Key business process includes all activities of design, build, deliver and support a product.**

Business Process Reengineering (BPR)

- Identify specific activities that can be improved through BPR, once it have been identified, Information Technology must be applied to radically improve business process.
- **Disruptive technologies**
  - are technologies that enable the breaking of long-held business rules that inhibit organizations from making radical business changes. (**decision support tools, wireless data communication, high performance computing can provide real-time updating)**