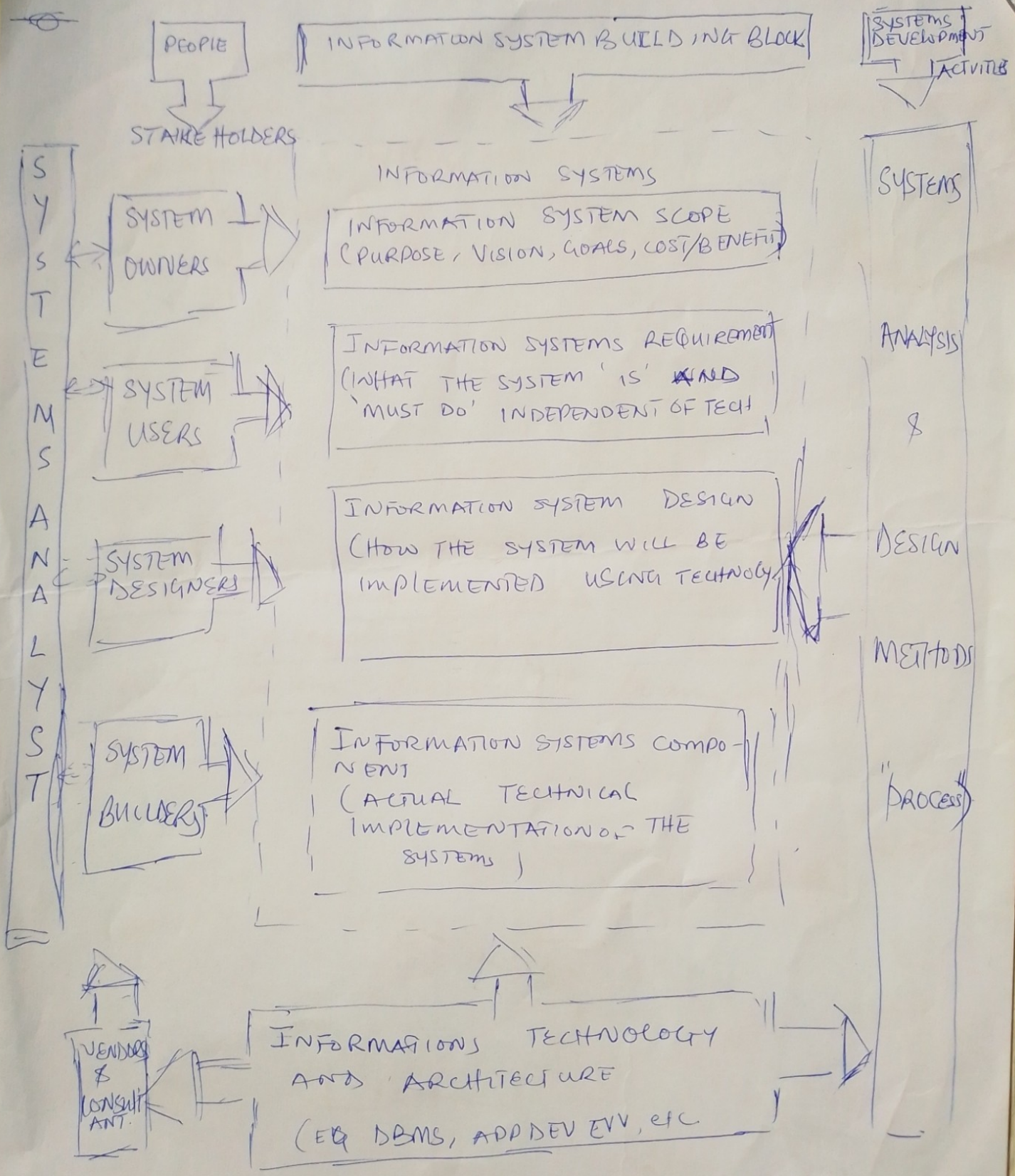
THE INFORMATION BUILDING BLOCK (BIG PICTURE)



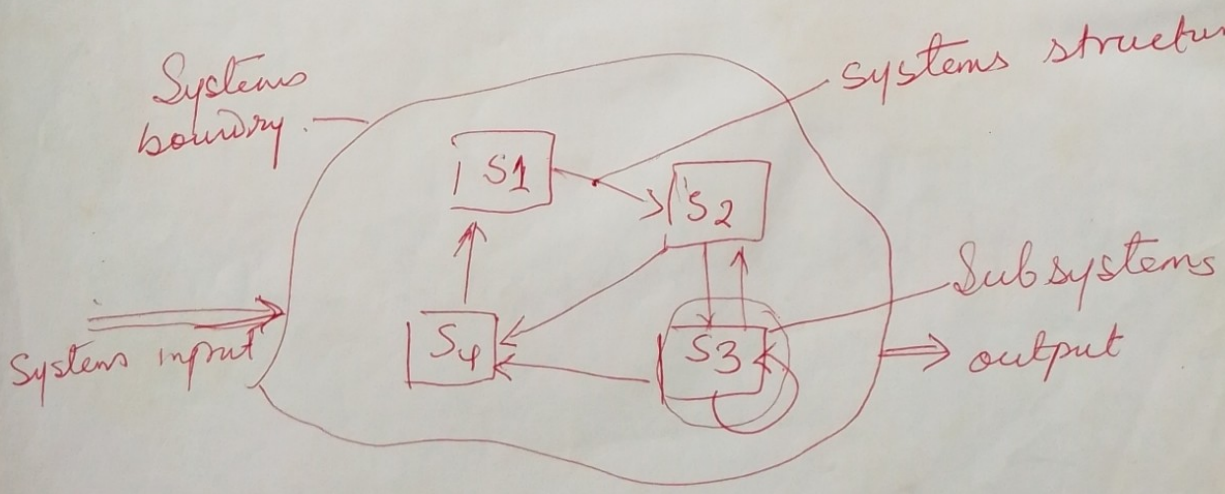
CONCEPT OF INFORMATION SYSTEM.

objective
* Define a System, Information System, Data, Information
* Concept of System with examples
* Components of a System
* Information System activities

The term System is derived from the greek word 'Systema' - means an organised relationship among functioning units or components.

WHAT IS A SYSTEM ?

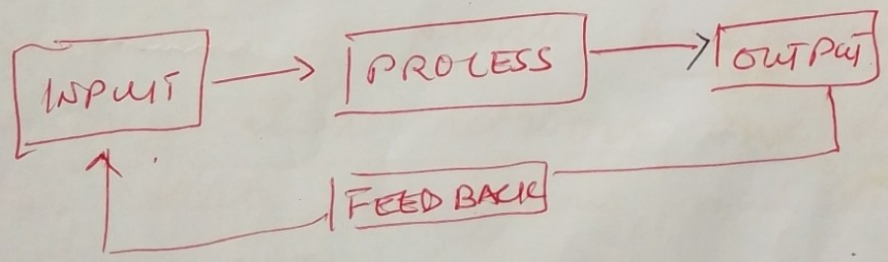
A System is a group of interrelated components working together toward a common goal by accepting inputs and producing outputs in an organised transformation process.



Contents

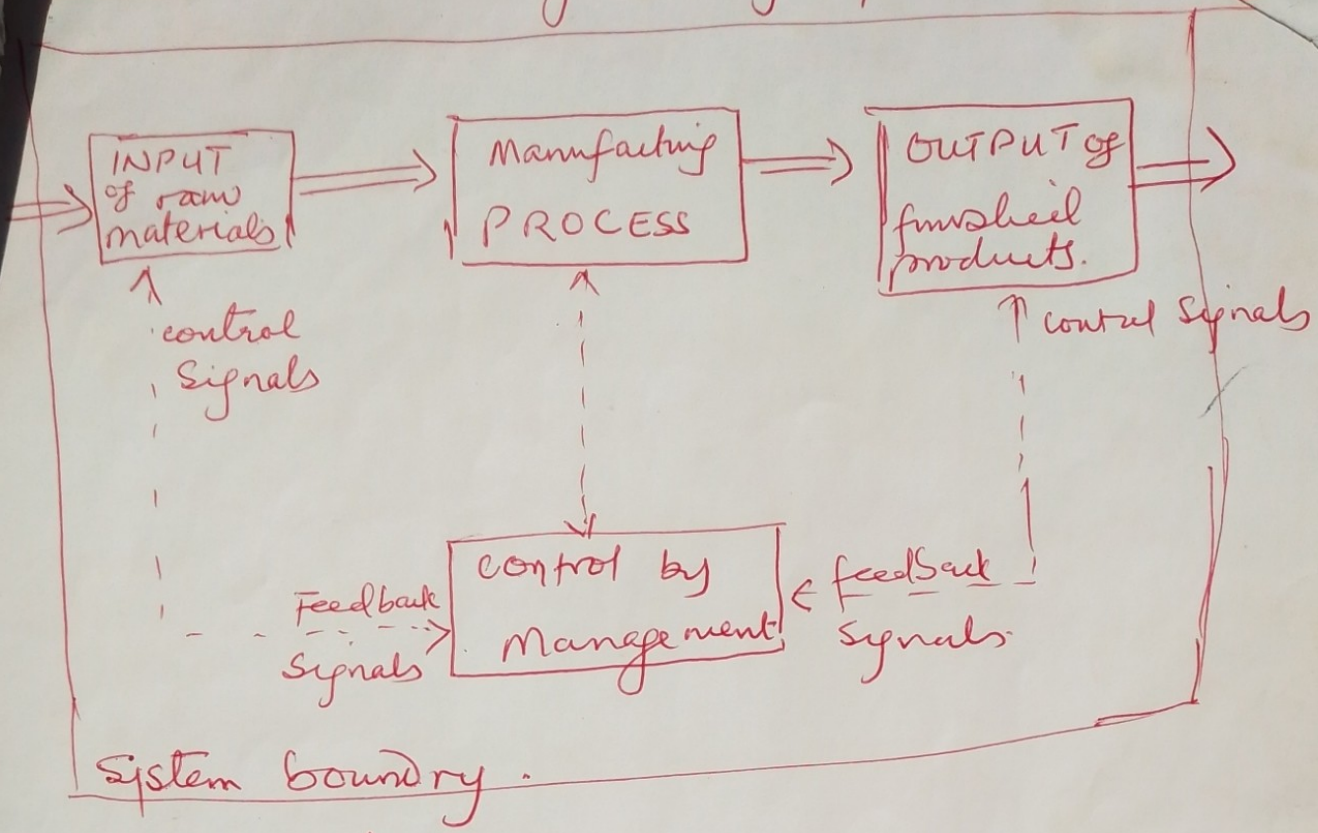
Systems structure : relationship between components
Sub System : Subset of the System
Environment/ boundry : boundry (domain of the System) anything outside the boundary forms the Environment.
input : What goes in into the System
Output : What goes out the System.
boundry : a line which marks the limits of an area.

ABSTRACT CONCEPT OF A SYSTEM



eg. Human System, Manufacturing System

Example : A manufacturing System.

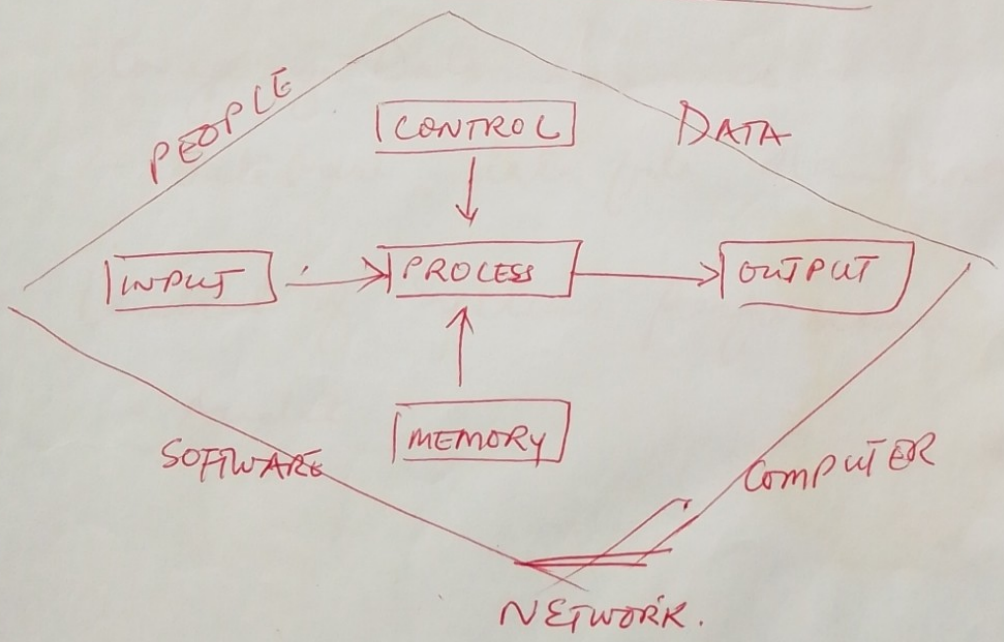


WHAT IS INFORMATION SYSTEM

An information System can be any organised combination of people, hardware, Software Communications network, and data resources that collects, transforms, and disseminates information in an organisation.

An information System – "Is an arrangement of people, data, processes, information presentation and information technology that interact to support and improve day-to-day operations in a business as well as support the problem-solving and decision-making needs of management and users."

COMPONENTS OF INFORMATION SYSTEM



Implies: ONE can not work without the other. If the software is there Some one needs to manage it.

INFORMATION SYSTEMS ACTIVITIES (Elements)

- INPUT DATA.
  - Manual input by key, Scanning, input etc.
- Processing of data into information.
  - Calculate, sort, find, report, etc.
- Output of information (products)
  - Report, display
- Storage of Data Resource
  - Database, data file, Maintenance
- Control of Systems performance
  - Audit.

other defns

DATA, INFORMATION, KNOWLEDGE.

Data: Streams of raw facts representing events such as business transactions, simple observations etc.
- easily structured
- easily captured on machines
- easily transfered, often quantified.

INFORMATION: Data endowed with relevance and purpose; useful to human beings in processes such as making decisions.
- requires unit of analysis/processing
- ~~Need~~ it ~~helps~~ in decision making

KNOWLEDGE:

: Information from the human mind (includes reflection) which guide human behaviour in correct way.
- Hard to structure
- Difficult to capture on machine
- Hard to transfer.

Example Data / information

Data.

Store 22 (15/05/2015)

111 coffee ₦300 2
115 ginger root ₦50 1
111 coffee ₦300 1
110 Custard ₦100 1

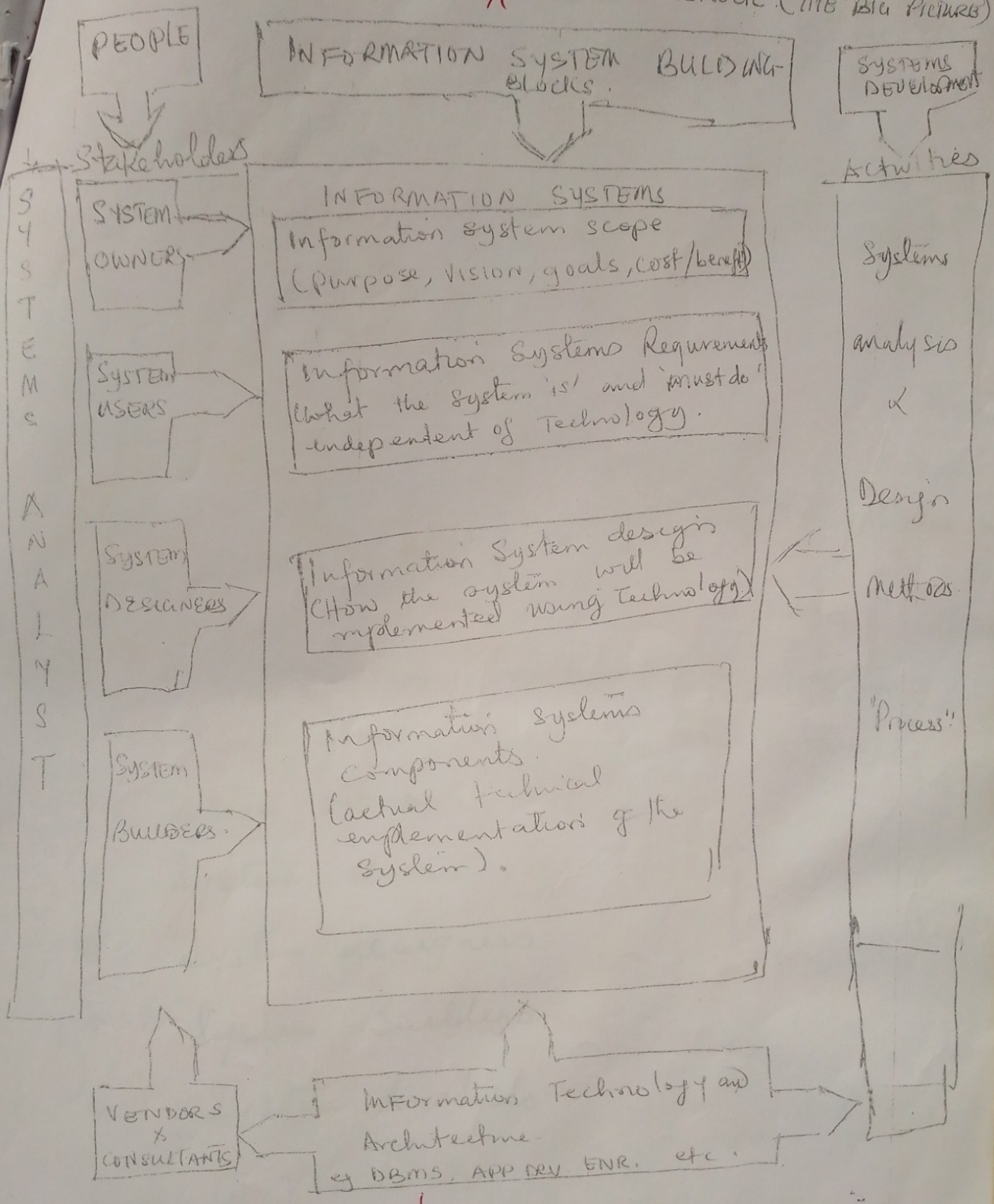
raw fruits.

⟹ Refined process ⟹

code 111 · (15/05/2015

Qty	Descript.	Amt
3	coffee	₦900.

THE INFORMATION System BUILDING BLOCK (THE BIG PICTURE) The Big Picture



INFORMATION SYSTEMS (Building)

Assuming you want to build an information system, who and who will be part of your team?. (stakeholders).

Stakeholders:- Is any person who has an interest in an existing or new information system. They can be technical or non-technical.

Stakeholders in information system development include the following

1. System owners
2. System users
3. System designers
4. System Builders
5. System Analysts
6. IT Vendors

8. # INFORMATION SYSTEMS (Building)

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5. System Analysts
6. IT Vendors

CHARACTER & ETHICS OF A SYSTEMS ANALYST

ETHICS : Is a personal character trait in which an individual understands the difference between 'right' and 'wrong' and acts accordingly.

example of code of conduct or ethics that some organisations require employees to sign.

" I SHALL NOT USE KNOWLEDGE OF A CONFIDENTIAL NATURE TO FURTHER MY PERSONAL INTEREST, NOR SHALL I VIOLATE THE PRIVACY AND CONFIDENTIALITY OF INFORMATION ENTRUSTED TO ME OR TO WHICH I MAY GAIN ACCESS.

THAT I HAVE AN OBLIGATION TO MY EMPLOYER WHOSE TRUST I HOLD THEREFORE, I SHALL ENDEAVOR TO DISCHARGE THIS OBLIGATION TO THE BEST OF MY ABILITY, TO GUARD MY EMPLOYERS INTERESTS AND TO ADVISE HIM OR HER WISELY AND HONESTLY "

① Principles of Successful Development

1. Get the users involved.
Analysts, Programmer, and other IT Specialists frequently refer to "My System" This attitude creates a "Us-versus-them" Conflict between technical staff, ~~and the~~ Users and the management. Thon, analyst and programmers designs produce fantastic solutions, yet it backfires because they dont address the organisational problems or they introduce new problems.

Therefore, we must make time for Users, insist on their participation and always agree.

- How?
- organise workshops
- meetings, agree
- understand their terms.

2. Use ~~the~~ problem solving approach.
Problems refers to real problems, opportunities for improvement and/or directives from management.
The classic problem solving approach is as follows

1. Study and understand the problem
2. Define requirements of a suitable solution
3. Identify candidate solutions and select the "best" solution
4. Design and or implement the solution
5. Observe and evaluate the solutions impact, - refine

3. Establish phases and activities

All SD life cycle methodologies prescribe phases and activities. The number of and scope of phases and activities varies from author to author, expert to expert

The phases are

a. Preliminary Investigation.
b. - Problem analysis
c. - requirement analysis
d. - Decision analysis
Analysis
e. Design
f. Construction
g. Implementation.

Investigation
Analysis
Design
Implem

4. Establish Standards.

An organisation should embrace standards for both information systems and the process used to develop those systems. In large organisations, system owners, users, analysts, come and go. Some will be promoted, some will quit etc. To promote good communication between constantly changing managers, users and IT professionals, you must develop standards to ensure consistent systems development.

Standards should encompass:
- Documentation — future System analyst
- Quality — ensure deliverables meet expectations
- Automated tools — technology at will be used
- Technology — architecture, Hardware standards etc.

⇒ object oriented design / ~~Software~~.

5. Justify System as capital Investment

Information Systems are capital investments just as fleet of trucks and new building are. ~~Cost~~ Two issues must be considered

(i) Cost effectiveness - is the result obtained by striking a balance btw the cost of developing and operating an information System and the benefits derived from that System.

(ii) Risk Management - process of identifying evaluating and controlling what might go wrong in project before it becomes a threat to the System.

Find out examples of Risks in information System Dev.

when talking abt benefits of an information ⇒ Long term / years.

(That will be convenient

- e.g Payroll System

~~Are must~~ We must identify the risks in implementing an information ⇒

6. Don't be afraid to Cancel or Revise Scope

Most system owners want more out of their systems, than they can afford or are willing to pay for. Also there is the temptation to continue with ~~the~~ a project only because of Investment already made: In the long run, cancelled projects are less costly than implemented disaster(!).

At each point, consider
- Cancel the project if it is no longer feasible
- Re-evaluate and adjust the cost and schedule if the project scope is to be increased
- Reduce scope if the project budget and schedule are frozen and not sufficient.

7. Divide and Conquer

Consider the old saying, "If you want to learn anything, you must not try to learn everything at least not all at once". In this reason, we divide a system into subsystems. By doing this we can easily conquer the problem and build the larger system.

6] · Outline a paper of writing

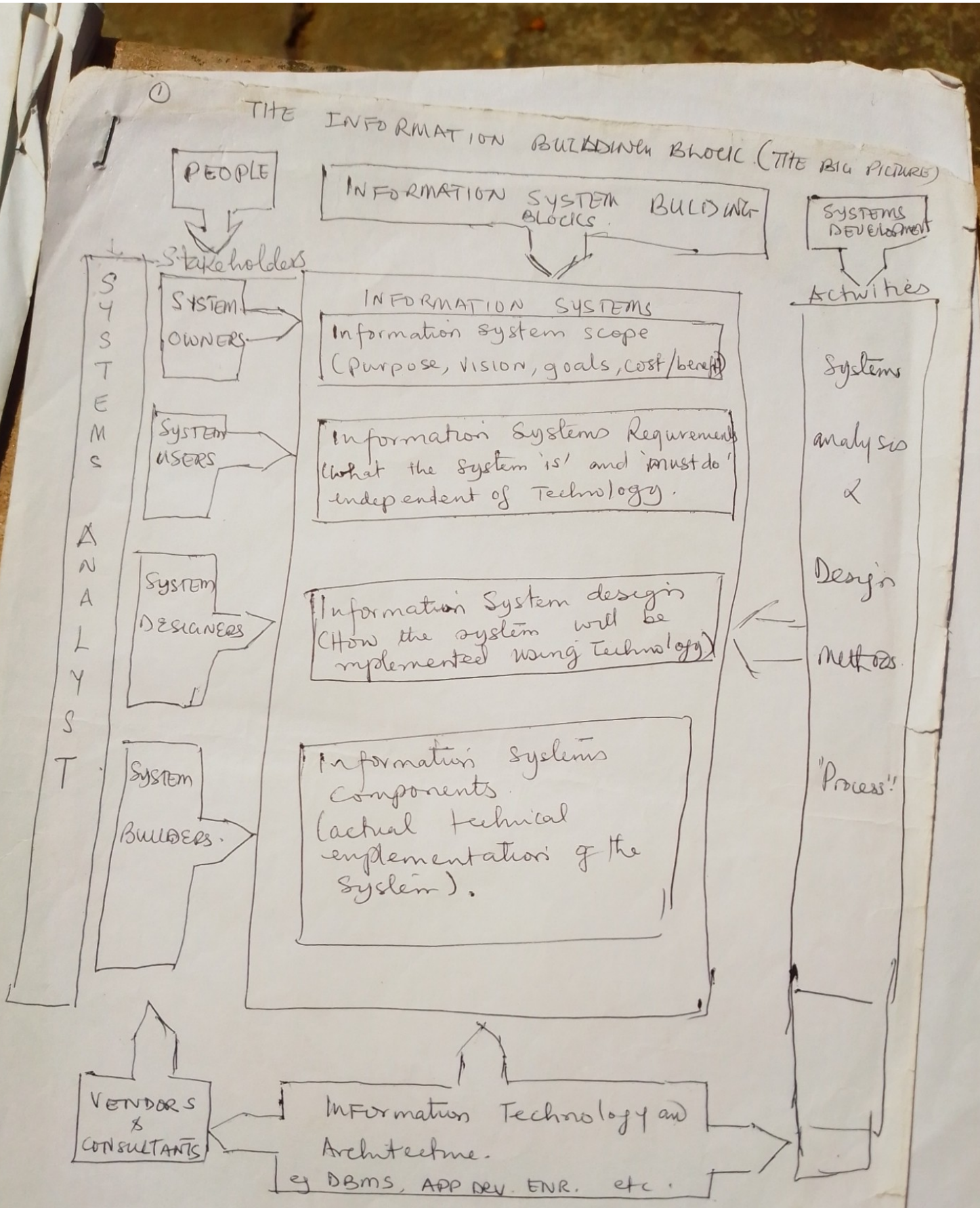
8. Design a System for Growth and Change

Many Systems analysts develop systems to meet only today's user requirement, because of pressure to develop the Systems as quickly as possible. Although this may seem to be necessary short term strategy, it frequently leads to the Long term problems.

* Pressure [especially as ~~days~~ in this era of web dev.

THE TEN COMMANDMENTS (ETHICS & System ANALYSIS)

1. Thou shalt not use a computer to harm other people.
2. Thou shalt not interfere with other people's computer work
3. Thou shalt not snoop around in other peoples Computer files
4. Thou shalt not use computer to steal
5. Thou shalt not use computer to bear false witness
6. Thou shall not copy software for which you have not paid.
7. Thou Shall not use other peoples computer resources without authorization or proper compensation.
8. Thou shalt not appropriate other peoples intellectual output
9. Thou shalt ~~not~~ think about Social consequences of the program you are writing or the System you are designing.
10. Thou shalt always use a computer in ways that ensure consideration and respect for your fellow humans.


①
THE INFORMATION BUILDING BLOCK (THE BIG PICTURE)
PEOPLE
INFORMATION SYSTEM BUILDING BLOCKS.
SYSTEMS DEVELOPMENT
Activities
Stakeholders
SYSTEMS ANALYST.
SYSTEM OWNERS
SYSTEM USERS
SYSTEM DESIGNERS
SYSTEM BUILDERS.
INFORMATION SYSTEMS
Information system scope (Purpose, vision, goals, cost/benefit)
Information Systems Requirements (what the system is' and 'must do' independent of Technology.
Information System design (How the system will be implemented using Technology)
Information systems components (actual technical implementation of the System).
Systems analysis & Design methods
"Process"
VENDORS & CONSULTANTS
Information Technology and Architecture.
eg DBMS, APP DEV. ENR. etc.

Information Building blocks

Assuming you want to build an information system
Who and who will be part of your team? (stakeholders)

Stakeholders: Is any person who has an interest in an existing or new information system. They can be technical or non-technical.

The stakeholders in information Systems development include the following: (classified into six groups)

1. System owners
2. System users
3. System designers
4. System builders
5. System Analysts
6. IT Venders

(3) Stakeholders classification

1. System owners - (1) Pay for the system to be built and maintained. They (2) own the system, set (3) priorities for the system and determine (4) policies for its use. In some cases, System owners may also be System (5) Users.

2. System Users:- Actually (1) use the System to perform or support the work to be completed. System ~~Owners~~ users (2) define the business requirements and performance expectations for the systems to be built. (client)

3. System Designers:- (1) Design the system to meet the users requirement. In many cases these technical specialists may also be System builders, database programmers and Software specialists.

(4)

System Builders:

Construct, test and deliver the system into operation.

5. System Analysts:

Facilitate the development of information systems and computer applications by bridging the communication gap that exists btw non-technical system owners and users and technical system designers and builders.

6. IT Vendors and Consultants - Sell hardware, software, services to businesses for incorporation into their information system.

Systems Analysis

A problem solving approach (technique) that decomposes a system into its component pieces for the purpose of studying how well those components part work and interact to accomplish their purpose.

System Design

A complementary problem-solving technique (to systems analysis) that re-assembles a system's component pieces back into a complete system. Hopefully an improved system. This may ~~include~~ involve adding, deleting and changing pieces relative to the original system

System analysis & Design

Refers to the process of examining a business situation with the intent of improving it through better procedures and methods.

Systems Analysis and Design

SAD. refers to the process of examining a business situation with the intent of improving it, through better procedures and methods. It relates to s

Systems development life cycle (SDLC)

SDLC. System development life cycle is an organisational process of developing and maintaining systems.

- It helps in
- establishing a system project plan

Various activities put together are referred to as system development life cycle.

* A framework that describes the activities performed at each stage of the software development project (SDLC)

- Phases

1. Preliminary study
2. feasibility study
3. Detailed System study
4. Systems analysis
5. System design
6. Coding
7. Testing
8. Implementation
9. Maintenance.

CMP 301 Systems analysis and design

1. System concept
2. System development lifecycle
   - Analysis - Fact finding techniques, dfd, etc.
   - System design - Architectural form design, security, environment, GUI design

Systems Analysis - refers to the process of examining a business situation with the intent of improving it through better procedures

SYSTEMS ANALYSIS & DESIGN

Systems analysis: Is the study of a business' problem domain to recommend improvements and specify the business requirements for the solution

Systems Design: Is the specification or construction of a technical, computer based solution for the business requirements identified in a systems analysis (Note: the design takes the form of a working prototype.

* Systems analyst: facilitates the development of information systems and computer applications.

* A systems analyst studies the problems and needs of an organisation to determine how people, data, processes, communications, and information technology can best accomplish improvements for the business.

(8)

What does a Systems Analyst do?

The Systems analyst is basically a problem Solver, and problem will be used to describe many situations including:

- true problem situations, either real or anticipated that require corrective action
- Opportunities to improve a situation despite the absence of complaints
- Directives to change a situation regardless of whether anyone has complained.

Most Systems analysts use some variation of problem-solving approach, which usually encorporates the following general steps:

1. Identify the problem.
2. Analyze and understand the problem
3. Identify Solution requirements or expectations
4. Identify alternative solutions and decide a course of action
5. Design and implement the "best" solution
6. Evaluate the results. If the problem is not Solved, returns to Step 1 or 2 as appropriate.

~~The job requires~~

SDLC activities

A Systems Development Methodology A

Project identification

Projects are basically initiated by users and owners of the system.

- problems - are undesirable situations that prevent the organisation from fully achieving its purpose goals and/or objectives

eg. A business might identify that it is taking too long to fulfill customer orders
A project would be initiated to achieve more responsible and timely order fulfilment
*problems might be real, suspected or anticipated

- Opportunity: is a chance to improve the organisation even in the absence of specific problems

Eg. Management is usually receptive to cost-cutting ideas, even when costs are not currently considered a problem. = Opportunistic improvement is the source of many of today's most interesting projects.

(Eg of working with organisation or watching from outside)

directive - is a new requirement that's imposed by management, government or some external influence.

eg (1) A government agency, may mandate that a new set of reports be produced each quarter.

Some directives may be technical
eg. converting inputs from Key input through Keyboard to using barcodes.

We could therefore say that project may be initiated from problems, opportunity or management directive.

* {Feasibility Studies ⇒ But is done Seperately
In some books ⇒ It done by the Management}

PRELIMINARY INVESTIGATION PHASE

In a classic Systems development process, this form the first phase. It is also called the initial study, Survey phase or planing phase. The investigation answers the following questions

"Is the project worth Looking at!"

To answer this question, the preliminary investigation must define the scope of the project and the perceived problems, opportunities and directives that triggered the project.

Assuming the project is worth Looking at - we must have or (establish) a project plan, interms of Scope, ~~development~~ schedule, resource requirement and budget.

Project plan is a formal document used to direct the project execution and control.

Note that this phase is concerned with the System owners. - They tend to be concerned with the big picture, not details. They also determine whether resources will be committed to the project.

The deliverable of this phase is a Project charter

A Project charter defines, the project scope, plan, methodology, standards etc. ⇒ One

A2

The investigation phase is intended to be quick. It should not exceed 2 or 3 days for most projects.

The Tasks

1.1. List problem, opportunities and directives
1.2 Negotiate preliminary scope
1.3 Assess project worth
1.4. Plan the project
1.5. Present the project and Plan.

1.1 List problems, opportunities, and directives

The important tasks of PI (~~Project~~ Prelim Investigation) is to establish an initial baseline of the problems, opportunities and/or directives that triggered the project. Also to consider any perceived constraints (budget, deadlines and technology)

The task is ~~handled~~ Headed by Senior Systems analyst.

The deliverable to this task is the Problem statement. (Problems, opportunity, directives that were identified).

(4) Output	Problem statement	Problems opportunity

A sample document as expressed in the (A3) following terms

1- Urgency: In what time frame must/should the problem be solved.

2- Visibility - To what degree would the solution or new system be visible to customers or management?

3- Benefits - Approximately how much would the solution or new system increase annual revenues or reduce annual costs.

4- Priority - Based on the answers ~~provided~~, what are the priorities for each problem opportunity or directive. If budget Schedule becomes a problem, these priorities will help to adjust the project scope.

5- Possible Solutions - At this stage, possible solutions are best expressed in

(a) leave well enough alone
(b) a quick fix
(c) a Simple - to - moderate enhancement of the existing System
(d) Redesign the existing System
(e) Design a new System.

(5)

Negotiate Scope

(A4)

Scope defines the boundry, of a project - those aspects of the business that will and will not be included. Scope can change during the project, however, the initial project plan must establish the preliminary scope.

- A Senior Analyst leads the task or the project manager
- The scope can be ~~described~~ or defined easily in form of

* Data — what type of DATA describ the System being studied eg Sales information System may require data about things as customers, orders, products and Sales representatives.

* BUSINESS PROCESS: what business processes are included in the System being studied. eg. Order entry, order management customer relationship Management.

* INTERFACE: How must the interface with Users, locations and other Systems eg: customers, Sales representative Sales clerks, regional sales offices etc.

(6)

PHASE (B1)

(A5)

TASK 1:3 ASSESS PROJECT WORTH

This is where we answer the question "Is this project worth looking at?" Questions like

Will solving the problem, exploiting opportunities or fulfilling directives return enough value to offset the costs that we will incure to develop this system? - ~~At~~ this point the project can be approved or cancelled, and project scope can be negotiated. Eg. Payroll System

TASK 1:4 Plan the project

If the project has been approved, has been deemed worthy to continue, we can now plan the project in depth.

* A preliminary master plan that includes schedule and resource assignments for the entire project - (baseline plan.)
* the detail plan and schedule for completing the next phase of the project

Task 1:5 PRESENT THE PROJECT PLAN

In most organisations, there are more potential projects than resources to staff and fund those projects. Most times, the project in question must be presented and defended to the Steering committee for approval.

Def:

A steering body is a committe of executive business and systems managers that studies and prioritizes competing project proposals to determine which project will return the most value to the organisation and thus should be approved for continued system development. It is also called the Steering committee.

With or without steering committee, there is always the need to present or lunch the project and communicate the project goals, and Schedule to the entire business community.

At this point, the project may be terminated if not endorsed. But if it receives the blessing of the systems owners and the steering committe the project can now proceed to the problem analysis stule.

~~Project Initiation~~ Summary (1)

Preliminary Investigation

1.1 List Problems, opportunities & directives
1.2. Negotiate Preliminary scope
1.3 Assess project worth
1.4. Plan the project
1.5. Present the project & /

1.1 List problems, opportunities -

- Establish an initial baseline of the problems
- Consider perceived constraints (budget, deadlines, tech)
- ~~headed~~ headed by the System analyst

⇒ Op. Problem statement.
Expressed in (A3) - Urgency, benefits, Priority, Possible Solns

1.2 Negotiate Scope

- scope defines the boundary of the project.
- Scope can change - but prelim scope must be established
- headed by Sw Analyst.
- Scope is defined in form of
  Data, business process, interface.
  - Data: what type of data are we talking abt? School info system may require data about Students, staff, etc.
  - business process: what business process are included - order entry,
  - interface: Locations of Regional offices (could also be interface with the IS)

1.3 Access the project worth.

- Questions like - "Is this project worth looking at?" "incurred."
- will the project return enough value to offset the costs?

@ this pt, project can be cancelled, or scope negotiated.

1.4 Plan the project

- One approved, proceed to plan the project.
  - Prelim Master Plan - includes schedules, resource assignment

* Use project management software:

1.5 Present the Project Plan

- The project must be presented and defended to the Steering committee. / score-sheet

~~SC - A body~~

A steering body - is a committee of executive business and systems managers at studies and prioritize competing project proposals. to determine which project will return the most value to the organisation

⇒ Presentation is important.

(2) this pt - project may be terminated if not endorsed - But if it receives the blessing of the System owners and SC - project can now proceed.

THE PROBLEM ANALYSIS PHASE. (B1)

The statement "Don't try to fix it unless you understand it" describes the problem analysis phase of systems analysis. There is always a current or existing system regardless of the degree to which it is automated with information technology.

This phase provides the analyst with a more thorough understanding of the problem, opportunity and or directive that triggered the project.

The phase answers the following questions. - "Are the problems really worth solving?" and "Is the new system worth building?" It is also known as the study phase, detailed investigation or feasibility analysis phase. (very important)

You need some level of understanding of the current system.

goal: The goal of problem analysis phase is to study and understand the problem domain well enough to thoroughly analyse the problem, opportunities and constraints. (9)

Depending on the size of the system, its complexity and the degree to which project worthiness is already known the following tasks are considered:-

2.1 Study the problem domain
2.2 Analyze problems and opportunities
2.3 (optional) Analysis business processes
2.4 Establish system improvement objective
2.5 Update project plan
2.6 Present findings and recommendations

TASK 2.1 Study the problem domain

During the problem analysis phase, the team initially attempts to learn about the current system. Each system owner, user and analyst brings a different level of understanding to the system. - different detail, different vocabulary, different perception and different opinions. A well conducted study can prove revealing to all parties including the system's own management and users. It is therefore important to study the domain where the problem exist.

Stakeholders
- diff ideas
- understanding
- vocabu
- percepts
- opinion

This task is led by the project Manager, but facilated by the Lead Systems analysts. The deliverable of this task are an understanding of the problem domain and the business vocabulary. The understanding must also be documented. The documentation should include the following:

- DATA - List all the things about which the system currently stores data (in files, database, forms, etc). Define each thing in business terms. Example: "An order is a business transaction in which a customer requests to purchase product".
  - we could also list all the reports currently produced by the current system and their purpose, use. eg. Variation report.

- PROCESSES - Define each business event for which a business response (process) is currently implemented. Eg "A customer places a new order" or "A customer requests changes to a previously placed order" or a "A customer cancels an order".

INTERFACES: Define all the locations that the current System serves and all the Users at each locations.
EX: The System is currently used at our Regional Offices in West Africa, East Africa, and South Africa.

Physical offices

- Each regional sales office has a Sales Manager, assistant sales Manager, and administrative Assistant.
- 10 sales representatives who upload orders and other transactions online.

Another facet of interface is System Interfaces - interfaces that currently exist between the current Information System and other information systems and or computer applications. This can be listed by the Information Systems Staff.

Documentation

- Data - A one page data model for establishing business vocabulary and rules.

- PROCESSES - A one - or two-page functional decomposition diagram should prove sufficient to get a feel of the current system.

- INTERFACE - A one page or use-case diagrams are very useful for illustrating the system's inputs and outputs with other business units and systems

Overall
- FACT finding techniques are useful in finding about existing system / Joint Reqm'g Planning technique / Ability to clearly Communicate back to the users what you have learned about a system is equally important.

Task 2.2. Analyze problems and opportunities

- Use the cause-and-effect analysis technique in which problems are studied to determine these causes and effects on the System

Task 2.3 Analyse business process.

- Keep focus on the process and not the people, because the owners of the System and users can become dependent about their existing business processes.
- The deliverable ⇒ Bygin picture of an form of Data flow diagram which shows (a) the Volume of data flowing through the processes (b) the response times of each process, (c) delays and bottle necks etc.

Task 2.4 Establish System improvement objectives.

Given our understanding of the current System's scope, problems, and opportunities we can establish System improvement objectives.

- Establish a criteria to which any improvements to the System will be measured and also identify any constraints that may limit flexibility in achieving the improvement.

Ex: Decrease by 50% the time spent required in payroll production.

Eg of Constraints

(BB)

- Schedules — The new system must be operational by April 15
- Cost — should not exceed 250,000.
- Technology — Must be online
- Policy — "policy".

Task 2.5 - Update the project plan.

Task 2.6 Present findings and recommendations

A formal business report and business presentation to the Community

At this point, the project can be authorised to continue, 'Adjust scope, cost, schedules or cancel' the project due to lack of resources or realization of benefits of the new system are not likely to exceed the costs.

Tools, such as data, process, and object models, will eventually be used to document facts, and conclusions will be drawn from facts. But if you can't collect the facts, you can't use those tools. Fact-finding skills must be learned and practiced!

Facts are in the domain of the business application and its end-users. Therefore, the analyst must collect those facts to effectively apply the documentation tools and techniques. During systems analysis phases, the analyst learns about the vocabulary, problems, opportunities, constraints, requirements, and priorities of a business and a system.

What types of facts must be collected? Fortunately, we have a framework to help us determine what facts need to be collected, no matter what project we are working on. Throughout the system development process, we are looking at an existing or target information system. In Chapter 2 we saw that any information system can be examined in terms of three building blocks: DATA, PROCESSES, and INTERFACES. Those three building blocks were depicted using our matrix model. The facts that describe any information system also correspond nicely with the building blocks of that matrix model.

Fact-Finding Ethics During your fact-finding exercises you often come across or analyze sensitive information. It could be a file of an aerospace company's pricing structure for a contract bid or employee profile data that includes salaries, performance history, medical history, and career plans. The analyst must protect the security and privacy of any facts or data. Many people and organizations in this highly competitive atmosphere are looking for an edge to get ahead. Careless systems analysts that leave sensitive documents in view on their desks or publicly discuss sensitive data could cause great harm to the organization or to individuals. If the data would fall into the wrong people's hands, the systems analyst may lose respect, credibility, or the confidence of users and management. In some cases they would be responsible for the invasion of a person's privacy and could be liable!

Most corporations make every effort to ensure they conduct business in an ethical manner because the laws require them to. Many corporations require their employees to attend annual training seminars on company ethics and reinforce the learning by displaying banners or signs that contain the company's code of conduct and ethics statements throughout the workplace in highly visible locations. Companies may distribute copies of their ethics policies to all employees or they may post policies on the Web, making them easily accessible to employees. Ethics policies document expected and required behavior. Violations of these policies could lead to disciplinary action or even termination. Ethics play a crucial role in fact-finding.

What Fact-Finding Methods Are Available? Now that we have a framework for our fact-finding activities, we can introduce seven common fact-finding techniques:

- Sampling of existing documentation, forms, and databases.
- Research and site visits.
- Observation of the work environment.
- Questionnaires.
- Interviews.
- Prototyping.
- Joint requirements planning

An understanding of each of these techniques could become essential to your success. An analyst usually applies several of these techniques during a single systems project. To be able to select the most suitable technique for use in any given situation, you will have to learn the advantages and disadvantages of each. They are discussed in detail later in the chapter.

it to specify their requirements and any changes that may arise. Managers use it to prepare project plans and estimates, and developers use it to understand what is required and to develop tests to validate the system. Taking the time to write the requirements correctly, concisely, and clearly will not only save time from a schedule point of view, but also save costs and reduce the risk of costly requirements errors. Performing requirements validation will help us achieve that goal.

Requirements validation checks the requirements definition document for accuracy, completeness, consistency, and conformance to standards.

Requirements validation is performed on a final draft of the requirements definition document after all input has been solicited from the system owners and users. The purpose of this activity is for the systems analyst to ensure the requirements are written correctly. Examples of errors the systems analyst might find are:

- System models that contain errors.
- Typographical or grammar errors.
- Requirements that conflict with each other.
- Ambiguous or poorly worded requirements.
- Lack of conformance to quality standards required for the document.

Requirements Management

Over the lifetime of the project it is very common for new requirements to emerge and existing requirements to change once a requirements definition document has been approved. Some studies have shown that as much as 50 percent or more of the requirements will change before the system is put into production. Obviously, this can be a major headache for the development team. To help alleviate the many problems this can cause it is necessary to perform requirements management.

Requirements management is the process of managing change to the requirements.

Requirements management encompasses the policies, procedures, and processes that govern how a change to a requirement is handled. It specifies how a change request should be submitted, how it is analyzed for impact to scope, schedule, and cost; how it's approved or rejected; and how the change is implemented if approved. If you desire additional information about this subject, many resources are available, and some are listed at the end of this chapter.

REQUIREMENTS DISCOVERY METHODS

Systems analysts need an organized method of collecting facts. They especially need to develop a detective-like mentality to be able to discern relevant facts. In this section we present popular, alternative fact-finding techniques.

Sampling of Existing Documentation, Forms, and Files

When you are studying an existing system, you can develop a good feel for the system by studying existing documentation, forms, and files. A good analyst always gets facts first from existing documentation rather than from people.

Collecting Facts from Existing Documentation The first document the analyst should seek out is the organization chart. Next, the analyst may want to trace the history that led to the project. To accomplish this, the analyst may want to collect and review documents that describe the problem. These include:

- Interoffice memoranda, studies, minutes, suggestion box notes, customer complaints, and reports that document the problem area.
- Accounting records, performance reviews, work measurement reviews, and other scheduled operating reports.
- Information systems project requests—past and present.

In addition to documents that describe the problem, there are usually documents that describe the business function being studied or designed. These documents may include:

- The company's mission statement and strategic plan.
- Formal objectives for the organization subunits being studied.
- Policy manuals that may place constraints on any proposed system.
- Standard operating procedures (SOPs), job outlines, or task instructions for specific day-to-day operations.
- Completed forms that represent actual transactions at various points in the processing cycle.
- Samples of manual and computerized databases.
- Samples of manual and computerized screens and reports.

Also, don't forget to check for documentation of previous system studies and designs performed by systems analysts and consultants. This documentation may include:

- Various types of flowcharts and diagrams.
- Project dictionaries or repositories.
- Design documentation, such as inputs, outputs, and databases.
- Program documentation.
- Computer operations manuals and training manuals.

All documentation collected should be analyzed to determine the information's currency. Don't discard outdated documentation. Just keep in mind that additional fact-finding will be needed to verify or update the facts collected. As you review existing documents, take notes, draw pictures, and use systems analysis and design tools to model what you are learning or proposing for the system.

Document and File Sampling Techniques Because it would be impractical to study every occurrence of every form or record in a file or database, systems analysts normally use sampling techniques to get a large enough cross section to determine what can happen in the system.

> **Sampling** is the process of collecting a representative sample of documents, forms, and records.

The key word is *representative*—the systems analyst seeks to sample enough forms to represent the full nature and complexity of the data. Experienced analysts avoid the pitfalls of sampling blank forms—they tell little about how the form is used, not used, or misused. When studying documents or records from a database table, you should study enough samples to identify all the possible processing conditions and exceptions. You use statistical sampling techniques to determine if the sample size is large enough to be representative.

The size of the sample depends on how representative you want the sample to be. There are many sampling issues and factors, which is a good reason to take an introductory statistics course. One simple and reliable formula for determining sample size is

$$\text{Sample size} = 0.25 \times (\text{Certainty factor}/\text{Acceptable error})^2$$

The certainty factor depends on how certain you want to be that the data sampled will not include variations not in the sample. The certainty factor is calculated from tables (available in many industrial engineering texts). A partial example of the table is given here.

Desired Certainty	Certainty Factor
95%	1.960
90	1.645
80	1.281

Suppose you want 90 percent certainty that a sample of invoices will contain no unsampled variations. Your sample size, SS, is calculated as follows:

$$SS = 0.25(1.645/0.10)^2 = 68$$

We need to sample 68 invoices to get the desired accuracy. If we want a higher level of certainty, we would have to sample a larger number of invoices.

Now suppose we know from experience that 1 in every 10 invoices varies from the norm. Based on this knowledge we can alter the above formula by replacing the heuristic .25 with $p(1-p)$.

$$SS = p(1-p)(1.645/0.10)^2$$

Where p is the proportion of invoices with variances.

By using this formula, we can reduce the number of samples required to get the desired accuracy.

$$SS = .10(1-.10)(1.645/0.10)^2 = 25$$

How do we choose our 25 invoices? Two commonly used sampling techniques are randomization and stratification.

Randomization is a sampling technique characterized as having no predetermined pattern or plan for selecting sample data.

Therefore, we just randomly choose 25 invoices based on the sample size calculated above.

Stratification is a systematic sampling technique that attempts to reduce the variance of the estimates by spreading out the sampling—for example, choosing documents or records by formula—and by avoiding very high or low estimates.

For computerized files, stratification sampling can be executed by writing a simple program. For instance, suppose our invoices were in a database that had a volume of approximately 250,000 invoices. Recall that our sample size needs to include 25 invoices. We will simply write a program that prints every 10,000th record (250,000/25). For manual files and documents, we could execute a similar scheme.

Research and Site Visits

A second fact-finding technique is to thoroughly research the problem domain. Most problems are not unique. Others have solved them before us. Organizations often contact or perform site visits at companies they know have experienced similar problems. If these companies are willing to share, valuable information can be obtained that may save tremendous time and cost in the development process. Memberships in professional societies such as the Association for Information Technology Professionals (AITP) or the Association for Information Systems (AIS) among others can provide a network of useful contacts.

Computer trade journals and reference books are also a good source of information. They can provide you with information on how others have solved similar problems, plus you can learn whether software packages exist to solve your problem. And now with recent advances in cyberspace, you don't even have to leave your desk to do it. Exploring the Internet via your personal computer can provide you with immeasurable amounts of information.

Observation of the Work Environment

Observation is an effective data-collection technique for obtaining an understanding of a system.

Observation is a fact-finding technique wherein the systems analyst either participates in or watches a person perform activities to learn about the system.

This technique is often used when the validity of data collected through other methods is in question or when the complexity of certain aspects of the system prevents a clear explanation by the end-users.

Collecting Facts by Observing People at Work Even with a well-conceived observation plan, the systems analyst is not assured that fact-finding will be successful. The following story, which appears in a book by Gerald M. Weinberg, *Rethinking Systems Analysis and Design,* gives an entertaining yet excellent example of some pitfalls of observation.[3]

The Railroad Paradox

About 30 miles from Gotham City lay the commuter community of Suburbantown. Each morning, thousands of Suburbanites took the Central Railroad to work in Gotham City. Each evening, Central Railroad returned them to their waiting spouses, children, and dogs.

Suburbantown was a wealthy suburb, and many of the spouses liked to leave the children and dogs and spend an evening in Gotham City with their mates. They preferred to precede their evening of dinner and theater with browsing among Gotham City's lush markets. But there was a problem. To allow time for proper shopping, a Suburbanite would have to depart for Gotham City at 2:30 or 3:00 in the afternoon. At that hour, no Central Railroad train stopped in Suburbantown.

Some Suburbanites noted that a Central train did pass through their station at 2:30, but did not stop. They decided to petition the railroad, asking that the train be scheduled to stop at Suburbantown. They readily found supporters in their door-to-door canvass. When the petition was mailed, it contained 253 signatures. About three weeks later, the petition committee received the following letter from the Central Railroad:

Dear Committee

Thank you for your continuing interest in Central Railroad operations. We take seriously our commitment to providing responsive service to all the people living along our routes, and greatly appreciate feedback on all aspects of our business. In response to your petition, our customer service representative visited the Suburbantown station on three separate days, each time at 2:30 in the afternoon. Although he observed with great care, *on none of the three occasions were there any passengers waiting for a southbound train.*

We can only conclude that there is no real demand for a southbound stop at 2:30, and must therefore regretfully decline your petition.

Yours sincerely,

Customer Service Agent

Central Railroad

What are the lessons learned from this story? For one, use the appropriate fact-finding technique for the problem at hand. Observation was an incorrect choice. Why would anyone be waiting for a 2:30 train when everyone knew the train

[3] Gerald M. Weinberg, *Rethinking Systems Analysis and Design,* pp. 23–24. Copyright © 1988, 1982 by Gerald M. Weinberg. Reprinted by permission of Dorset House Publishing, 353 W. 12th St., New York, NY 10014 (212-620-4053/1-800-DH-BOOKS/www.dorsethouse.com). All rights reserved.

didn't stop? A second lesson to be learned is to verify your fact-finding results with the user. Based on the user feedback, you may discover that you need to try other fact-finding techniques to gather additional information. Never jump to conclusions!

Observation Advantages and Disadvantages Observation can be a very useful and beneficial fact-finding technique provided you have the ability to observe thoroughly and accurately. The pros and cons of observation include the following:

Advantages

- Data gathered by observation can be highly reliable. Sometimes observations are conducted to check the validity of data obtained directly from individuals.
- The systems analyst is able to see exactly what is being done. Complex tasks are sometimes difficult to clearly explain in words. Through observation, the systems analyst can identify tasks that have been missed or inaccurately described by other fact-finding techniques. Also, the analyst can obtain data describing the physical environment of the task (e.g., physical layout, traffic, lighting, noise level).
- Observation is relatively inexpensive compared with other fact-finding techniques. Other techniques usually require substantially more employee release time and copying expenses.
- Observation allows the systems analyst to do work measurements.

Disadvantages

- Because people usually feel uncomfortable when being watched, they may unwittingly perform differently when being observed. The famous Hawthorne experiment proved that the act of observation can alter behavior.
- The work being observed may not involve the level of difficulty or volume normally experienced during that time period.
- Some systems activities may take place at odd times, causing a scheduling inconvenience for the systems analyst.
- The tasks being observed are subject to various types of interruptions.
- Some tasks may not always be performed in the manner in which they are observed by the systems analyst. For example, the systems analyst might have observed how a company filled several customer orders. However, the procedures observed may have been those steps used to fill a number of regular customer orders. If any of those orders had been special orders (e.g., an order for goods not normally kept in stock), the systems analyst would have observed a different set of procedures being executed.
- If people have been performing tasks in a manner that violates standard operating procedures, they may temporarily perform their jobs correctly while you are observing them. In other words, people may let you see what they want you to see.

Guidelines for Observation How does the systems analyst obtain facts through observation? Does one simply arrive at the observation site and begin recording everything that's viewed? Of course not. Much preparation should occur first. The analyst must determine how data will actually be captured. Will special forms on which to quickly record data be necessary? Will the individuals being observed be bothered by having someone watch and record their actions? When are the low, normal, and peak periods of operations for the task to be observed? The systems analyst must identify the ideal time to observe a particular aspect of the system.

Observation should first be conducted when the workload is normal. Afterward, observations can be made during peak periods to gather information for measuring

the effects caused by the increased volume. The systems analyst might also obtain samples of documents or forms that will be used by those being observed. A great deal of planning and preparation must be done.

The sampling techniques discussed earlier are also useful for observation. In this case, the technique is called work sampling.

> **Work sampling** is a fact-finding technique that involves a large number of observations taken at random intervals.

This technique is less threatening to the people being observed because the observation period is not continuous. When using work sampling, you need to predefine the operations of the job to be observed. Then calculate a sample size as you did for document and file sampling. Make that many random observations, being careful to observe activities at different times of the day. By counting the number of occurrences of each operation during the observations, you will get a feel for how employees spend their days.

With proper planning completed, the actual observation can be done. Effective observation is difficult to carry out. Experience is the best teacher; however, the following guidelines may help you develop your observation skills:

- Determine the who, what, where, when, why, and how of the observation.
- Obtain permission from appropriate supervisors or managers.
- Inform those who will be observed of the purpose of the observation.
- Keep a low profile.
- Take notes during or immediately following the observation.
- Review observation notes with appropriate individuals.
- Don't interrupt the individuals at work.
- Don't focus heavily on trivial activities.
- Don't make assumptions.

Living the System In this type of observation the systems analyst actively performs the role of the user for a short time. This is one of the most effective ways to learn about problems and requirements of the system. By filling the user's shoes, a systems analyst quickly gains an appreciation for what the user experiences and what she has to do to perform the job. This type of role-playing gives the systems analyst a firsthand education on the business processes and functions, as well as the problems and challenges associated with them.

Questionnaires

Another fact-finding technique is to conduct surveys through questionnaires.

> **Questionnaires** are special-purpose documents that allow the analyst to collect information and opinions from respondents.

The document can be mass-produced and distributed to respondents, who can then complete the questionnaire on their own time. Questionnaires allow the analyst to collect facts from a large number of people while maintaining uniform responses. When dealing with a large audience, no other fact-finding technique can tabulate the same facts as efficiently.

Collecting Facts by Using Questionnaires The use of questionnaires has been heavily criticized and is often avoided by systems analysts. Many systems analysts claim that the responses lack reliable and useful information. But questionnaires can be an effective method for gathering facts, and many of these criticisms can be attributed to the inappropriate or ineffective use of questionnaires by systems analysts. Before using questionnaires, you should first understand the pros and cons associated with their use.

Advantages

- Most questionnaires can be answered quickly. People can complete and return questionnaires at their convenience.
- Questionnaires provide a relatively inexpensive means for gathering data from a large number of individuals.
- Questionnaires allow individuals to maintain anonymity. Therefore, individuals are more likely to provide the real facts, rather than telling you what they think their boss would want them to.
- Responses can be tabulated and analyzed quickly.

Disadvantages

- The number of respondents is often low.
- There's no guarantee that an individual will answer or expand on all the questions.
- Questionnaires tend to be inflexible. There's no opportunity for the systems analyst to obtain voluntary information from individuals or to reword questions that may have been misinterpreted.
- It's not possible for the systems analyst to observe and analyze the respondent's body language.
- There is no immediate opportunity to clarify a vague or incomplete answer to any question.
- Good questionnaires are difficult to prepare.

Types of Questionnaires There are two formats for questionnaires, free-format and fixed-format.

Free-format questionnaires offer the respondent greater latitude in the answer. A question is asked, and the respondent records the answer in the space provided after the question.

Here are two examples of free-format questions:

- What reports do you currently receive and how are they used?
- Are there any problems with these reports (e.g., are they inaccurate, is there insufficient information, or are they difficult to read and/or use)? If so, please explain.

Such responses may be difficult to tabulate. Also, the respondents' answers may not match the questions asked. To ensure good responses in free-format questionnaires, the analyst should phrase the questions in simple sentences and not use words, such as *good,* that can be interpreted differently by different respondents. The analyst should also ask questions that can be answered with three or fewer sentences. Otherwise, the questionnaire may take up more time than the respondent is willing to sacrifice.

The second type of questionnaire is fixed-format.

Fixed-format questionnaires contain questions that require selection of predefined responses.

Given any question, the respondent must choose from the available answers. This makes the results much easier to tabulate, but the respondent cannot provide additional information that might prove valuable. There are three types of fixed-format questions.

1. For **multiple-choice questions,** the respondent is given several answers. The respondent should be told if more than one answer can be selected. Some multiple-choice questions allow for very brief free-format responses when

none of the standard answers apply. Examples of multiple-choice, fixed-format questions are:

Do you feel that backorders occur too frequently?
☐ YES ☐ NO

Is the current accounts receivable report that you receive useful?
☐ YES ☐ NO
If no, please explain.

2. For **rating questions,** the respondent is given a statement and asked to use supplied responses to state an opinion. To prevent built-in bias, there should be an equal number of positive and negative ratings. The following is an example of a rating fixed-format question:

   The implementation of quantity discounts would cause an increase in customer orders.
   ☐ Strongly agree
   ☐ Agree
   ☐ No opinion
   ☐ Disagree
   ☐ Strongly disagree

3. For **ranking questions,** the respondent is given several possible answers, which are to be ranked in order of preference or experience. An example of a ranking fixed-format question is:

   Rank the following transactions according to the amount of time you spend processing them:
   _____% new customer orders
   _____% order cancellations
   _____% order modifications
   _____% payments

Developing a Questionnaire Good questionnaires are "designed." If you write your questionnaires without designing them first, you reduce your chances of success. The following procedure is effective:

1. Determine what facts and opinions must be collected and from whom you should get them. If the number of people is large, consider using a smaller, randomly selected group of respondents.
2. Based on the needed facts and opinions, determine whether free- or fixed-format questions will produce the best answers. A combination format that permits optional free-format clarification of fixed-format responses is often used.
3. Write the questions. Examine them for construction errors and possible misinterpretations. Make sure that the questions don't offer your personal bias or opinions. Edit the questions.
4. Test the questions on a small sample of respondents. If your respondents had problems with them or if the answers were not useful, edit the questions.
5. Duplicate and distribute the questionnaire.

Interviews

The personal interview is generally recognized as the most important and most often used fact-finding technique.

Interviews are a fact-finding technique whereby the systems analysts collect information from individuals through face-to-face interaction.

Interviewing can be used to achieve any or all of the following goals: find facts, verify facts, clarify facts, generate enthusiasm, get the end-user involved, identify requirements, and solicit ideas and opinions. There are two roles assumed in an interview. The systems analyst is the **interviewer,** responsible for organizing and conducting the interview. The system user or system owner is the **interviewee,** who is asked to respond to a series of questions.

There may be one or more interviewers and/or interviewees. In other words, interviews may be conducted one-on-one or many-to-many. Unfortunately, many systems analysts are poor interviewers. In this section you will learn how to conduct proper interviews.

Collecting Facts by Interviewing Users The most important element of an information system is people. No other fact-finding technique places as much emphasis on people as interviews, but people have different values, priorities, opinions, motivations, and personalities. Therefore, to use the interviewing technique, you must possess good human relations skills for dealing effectively with different types of people. Like other fact-finding techniques, interviewing isn't the best method for all situations. Interviewing has its advantages and disadvantages, which should be weighed against those of other fact-finding techniques.

Advantages

- Interviews give the analyst an opportunity to motivate the interviewee to respond freely and openly to questions. By establishing rapport, the systems analyst is able to give the interviewee a feeling of actively contributing to the systems project.
- Interviews allow the systems analyst to probe for more feedback from the interviewee.
- Interviews permit the systems analyst to adapt or reword questions for each individual.
- Interviews give the analyst an opportunity to observe the interviewee's nonverbal communication. A good systems analyst may be able to obtain information by observing the interviewee's body movements and facial expressions as well as by listening to verbal replies to questions.

Disadvantages

- Interviewing is a very time-consuming, and therefore costly, fact-finding approach.
- Success of interviews is highly dependent on the systems analyst's human relations skills.
- Interviewing may be impractical due to the location of interviewees.

Interview Types and Techniques There are two types of interviews, unstructured and structured.

Unstructured interviews are conducted with only a general goal or subject in mind and with few, if any, specific questions. The interviewer counts on the interviewee to provide a framework and direct the conversation.

This type of interview frequently gets off the track, and the analyst must be prepared to redirect the interview back to the main goal or subject. For this reason, unstructured interviews don't usually work well for systems analysis and design.

In **structured interviews** the interviewer has a specific set of questions to ask of the interviewee.

Depending on the interviewee's responses, the interviewer will direct additional questions to obtain clarification or amplification. Some of these questions may be

planned and others spontaneous. **Open-ended questions** allow the interviewee to respond in any way that seems appropriate. An example of an open-ended question is "Why are you dissatisfied with the report of uncollectible accounts?" **Closed-ended questions** restrict answers to either specific choices or short, direct responses. An example of such a question might be "Are you receiving the report of uncollectible accounts on time?" or "Does the report of uncollectible accounts contain accurate information?" Realistically, most questions fall between the two extremes.

How to Conduct an Interview

Your success as a systems analyst is at least partially dependent on your ability to interview. A successful interview involves selecting appropriate individuals to interview, preparing extensively for the interview, conducting the interview properly, and following up on the interview. Here we examine each of these steps in more detail. Let's assume that you've identified the need for an interview and you have determined exactly what kinds of facts and opinions you need.

Select Interviewees You should interview the end-users of the information system you are studying. A formal organizational chart will help you identify these individuals and their responsibilities. You should attempt to learn as much as possible about each individual before the interview. Attempt to learn their strengths, fears, biases, and motivations. The interview can then be geared to take the characteristics of the individual into account.

- Use the organizational chart (end-users)
- Make appointment
- get Supervisors approval
- location is available

Always make an appointment with the interviewee. Never just drop in. Limit the appointment to somewhere between a half hour and an hour. The higher the management level of the interviewee, the less time you should schedule. If the interviewee is a clerical, service, or blue-collar worker, get the supervisor's permission before scheduling the interview. Be certain that the location you want for the interview will be available during the time the interview is scheduled. Never conduct an interview in the presence of your officemates or the interviewee's peers.

Prepare for the Interview Preparation is the key to a successful interview. An interviewee can easily detect an unprepared interviewer and may resent the lack of preparation because it wastes valuable time. When the appointment is made, the interviewee should be notified about the subject of the interview. To ensure that all pertinent aspects of the subject are covered, the analyst should prepare an interview guide.

* Notify interviewee

An **interview guide** is a list of specific questions the interviewer will ask the interviewee.

The interview guide may also contain follow-up questions that will be asked only if the answers to other questions warrant the additional answers. A sample interview guide is presented in Figure 6.5. The agenda is carefully laid out with the specific time allocated to each question. Time should also be reserved for follow-up questions and redirecting the interview. Questions should be carefully chosen and phrased. Most questions begin with the standard who, what, when, where, why, and how much type of wording. Avoid the following types of questions:

Avoid

- *Loaded questions,* such as "Do we have to have both of these columns on the report?" The question conveys the interviewer's personal opinion on the issue.
- *Leading questions,* such as "You're not going to use this OPERATOR CODE, are you?" The question leads the interviewee to respond, "No, of course not," regardless of actual opinion.
- *Biased questions,* such as "How many codes do we need for FOOD CLASSIFICATION in the INVENTORY FILE? I think 20 ought to cover it." Why bias the interviewee's answer with your own?

FIGURE 6.5 *Sample Interview Guide*

Interviewee: Jeff Bentley, Accounts Receivable Manager
Date: Tuesday, March 23, 2000
Time: 1:30 P.M.
Place: Room 223, Admin. Bldg.
Subject: Current Credit-Checking Policy

Time Allocated	Interviewer Question or Objective	Interviewee Response
1 to 2 min.	**Objective** Open the interview: – Introduce ourselves. – Thank Mr. Bentley for his valuable time. – State the purpose of the interview—to obtain an understanding of the existing credit-checking policies.	
5 min.	**Question 1** What conditions determine whether a customer's order is approved for credit? **Follow-up**	
5 min.	**Question 2** What are the possible decisions or actions that might be taken once these conditions have been evaluated? **Follow-up**	
3 min.	**Question 3** How are customers notified when credit is not approved for their order? **Follow-up**	
1 min.	**Question 4** After a new order is approved for credit and placed in the file containing orders that can be filled, a customer might request that a modification be made to the order. Would the order have to go through credit approval again if the new total order cost exceeds the original cost? **Follow-up**	
1 min.	**Question 5** Who are the individuals that perform the credit checks? **Follow-up**	
1 to 3 min.	**Question 6** May I have permission to talk to those individuals to learn specifically how they carry out the credit-checking process? **Follow-up** If so: When would be an appropriate time to meet with each of them?	
1 min.	**Objective** Conclude the interview: – Thank Mr. Bentley for his cooperation and assure him that he will be receiving a copy of what transpired during the interview.	
21 minutes	Time allotted for base questions and objectives	
9 minutes	Time allotted for follow-up questions and redirection	
30 minutes	Total time allotted for interview (1:30 p.m. to 2:00 p.m.)	

General Comments and Notes:

Additional guidelines for questions are provided below. You should especially avoid threatening or critical questions. The purpose of the interview is to investigate, not to evaluate or criticize.

Interview Question Guidelines

- Use clear and concise language.
- Don't include your opinion as part of the question.
- Avoid long or complex questions.
- Avoid threatening questions.
- Don't use "you" when you mean a group of people.

Conduct the Interview The actual interview can be characterized as consisting of three phases: the opening, body, and conclusion. The **interview opening** is intended to influence or motivate the interviewee to participate and communicate by establishing an ideal environment. When establishing an environment of mutual trust and respect, you should identify the purpose and length of the interview and explain how the gathered data will be used. Here are three ways to effectively begin an interview:

- Summarize the apparent problem, and explain how the problem was discovered.
- Offer an incentive or reward for participation.
- Ask the interviewee for advice or assistance.

The **interview body** represents the most time-consuming phase. During this phase, you obtain the interviewee's responses to your list of questions. Listen closely and observe the interviewee. Take notes concerning both verbal and nonverbal responses from the interviewee. It's very important for you to keep the interview on track. Anticipate the need to adapt the interview to the interviewee. Often questions can be bypassed if they have been answered earlier in part of an answer to another question, or they can be deleted if determined to be irrelevant, based on what you've already learned during the interview. Finally, probe for more facts when necessary.

During the **interview conclusion,** you should express your appreciation and provide answers to any questions posed by the interviewee. The conclusion is very important for maintaining rapport and trust with the interviewee.

The importance of human relations skills in interviewing cannot be overemphasized. These skills must be exercised throughout the interview. Here is a set of rules that should be followed during an interview.

Do

- Be courteous.
- Listen carefully.
- Maintain control.
- Probe.
- Observe mannerisms and nonverbal communication.
- Be patient.
- Keep interviewee at ease.
- Maintain self-control.

Avoid

- Continuing an interview unnecessarily.
- Assuming an answer is finished or leading nowhere.
- Revealing verbal and nonverbal clues.
- Using jargon.
- Revealing your personal biases.
- Talking instead of listening.
- Assuming anything about the topic and the interviewee.
- Tape recording—a sign of poor listening skills.

Follow Up on the Interview To help maintain good rapport and trust with interviewees, you should send them a memo that summarizes the interview. This memo should remind the interviewees of their contributions to the project and allow them the opportunity to clarify any misinterpretations that you may have derived during the interview. In addition, the interviewees should be given the opportunity to offer additional information they may have failed to bring out during the interview.

Listening When most people talk about communication skills they think of speaking and writing. The skill of listening rarely gets mentioned, but it may be the most important skill during the interviewing process. To conduct a successful interview you must distinguish between hearing and listening. "To hear is to recognize that someone is speaking, to listen is to understand what the speaker wants to communicate."[4]

We have been conditioned most of our lives not to listen. We ignore our quarreling brothers and sisters while we enjoy our favorite music CD, or we study by blocking out distractions such as noisy roommates. We have learned not to listen, but we can also learn how to listen effectively.

When working with users to solve their problems, getting the users to communicate may be difficult. The following guidelines can open the lines of communication.

- *Approach the session with a positive attitude.* Approaching the project or person with a negative attitude is fighting a losing battle. You have a job to do! Make the best of it and look at it as a fun, pleasurable experience.
- *Set the other person at ease.* Presenting a cheerful attitude can help the person relax. Start by talking about the person's interests or hobbies. Showing an interest in his personal life can serve as an icebreaker.
- *Let them know you are listening.* Always maintain eye contact when listening and use a response such as a head nod or "uh-huh" to indicate that you acknowledge what the other person is saying. Have good posture and even sit on the edge of your seat and lean forward. This will tell the speaker that you are really interested in what she is saying.
- *Ask questions.* To make sure you clearly understand what the person is saying or to clarify a point, ask a question. This will show that you are listening and will also give the other person the opportunity to expand on the answer.
- *Don't assume anything.* One of the worst things you can do is to get in a hurry and be impatient with the speaker. For example, you assume you know what the other person is going to say so you cut in and finish the sentence, possibly missing what the person was going to say and probably irritating the speaker. Or you interrupt or stop the speaker because you may have already heard that information and you believe it is not applicable to what you are doing, thus risking missing a valuable piece of information. Don't assume anything! Art Linkletter learned this lesson on his popular television show, "House Party," when he asked a child a philosophical question:

  On my show I once had a child tell me he wanted to be an airline pilot. I asked him what he'd do if all the engines stopped out over the Pacific Ocean. He said, "First I would tell everyone to fasten their seatbelts, and then I'd find my parachute and jump out."

  While the audience rocked with laughter, I kept my attention on the young man to see if he was being a smart alec. The tears that sprang into his eyes alerted me

[4] Thomas R. Gildersleeve, *Successful Data Processing Systems Analysis* (Englewood Cliffs, NJ: Prentice Hall, 1978), p. 93.

to his chagrin more than anything he could have said, so I asked him why he'd do such a thing. His answer revealed the sound logic of a child: "I'm going for gas . . . I'm coming back!"[5]

- *Take notes* Taking notes serves two purposes. First, by jotting down brief notes while the other person is speaking, you give him the impression that what he has to say is important enough that you want to write it down. Second, it helps you remember the major points of the meeting later.

Body Language and Proxemics What is body language, and why should a systems analyst care about it during the interviewing process?

Body language is all the nonverbal information that we all communicate and are usually unaware of.

Research has determined a startling fact—of a person's total feelings, only 7 percent are communicated verbally (in words), 38 percent are communicated by the tone of voice used, and 55 percent are communicated by facial and body expressions. If you listen only to someone's words, you are missing most of what she has to say!

For this discussion, we will focus on just three aspects of body language: facial disclosure, eye contact, and posture. Facial disclosure means you can sometimes understand how people feel by watching the expressions on their faces. Many common emotions have easily recognizable facial expressions associated with them. However, the face is one of the most controlled parts of the body. Some people who are aware that their expressions often reveal what they are thinking are very good at controlling these expressions.

Another form of nonverbal communication is eye contact. Eye contact is the least controlled part of the face. Have you ever spoken to someone who will not look directly at you? How did it make you feel? A continual lack of eye contact may indicate uncertainty. A normal glance is usually from three to five seconds in length; however, direct eye contact time should increase with distance. As an analyst, you need to be careful not to use excessive eye contact with threatened users so that you won't further intimidate them. Direct eye contact can cause strong feelings, either positive or negative, in other people. If eyes are "the window to the soul," be sure to search for any information they may provide.

Posture is the least controlled aspect of the body. As such, body posture holds a wealth of information for the astute analyst. Members of a group who are in agreement tend to display the same posture. A good analyst will watch the audience for changes in posture that could indicate anxiety, disagreement, or boredom. An analyst should normally maintain an "open" body position signaling approachability, acceptance, and receptiveness. In special circumstances, the analyst may choose to use a confrontation angle of head-on or at a 90-degree angle to another person to establish control and dominance.

In addition to the information communicated by body language, individuals also communicate via proxemics.

Proxemics is the relationship between people and the space around them. Proxemics is a factor in communications that can be controlled by the knowledgeable analyst.

People tend to be very territorial about their space. Observe where your classmates sit in a course that does not have assigned seats. Or the next time you are talking with someone, deliberately move much closer or farther away and see what happens. A good analyst is aware of four spatial zones:

[5] Donald Walton, *Are You Communicating? You Can't Manage Without It* (New York: McGraw-Hill Cos., 1989), p. 31.

- Intimate zone—closer than 1.5 feet.
- Personal zone—from 1.5 feet to 4 feet.
- Social zone—from 4 feet to 12 feet.
- Public zone—beyond 12 feet.

Certain types of communications occur only in some of these zones. For example, an analyst conducts most interviews with system users in the personal zone. But the analyst may need to move back to the social zone if the user displays any signs (body language) of being uncomfortable. Sometimes increasing eye contact can make up for a long distance that can't be changed. Many people use the fringes of the social zone as a "respect" distance.

We have examined some of the informal ways that people communicate their feelings and reactions. A good analyst will use all the information available, not just the written or verbal communications of others.

Discovery Prototyping

Another type of fact-finding technique is prototyping. Prototyping was introduced in Chapter 3 for use in rapid application development (RAD). The concept behind prototyping was building a small working model of the users' requirements or a proposed design for an information system. This type of prototyping is usually a design technique, but the approach can be applied earlier in the systems development life cycle to perform fact-finding and requirements analysis. This is performed by building discovery prototypes.

Discovery prototyping is the act of building a small-scale, representative or working model of the users' requirements to discover or verify those requirements.

Discovery prototyping is frequently applied to systems development projects, especially when the development team is having problems defining system requirements. The philosophy is that users will recognize their requirements when they see them. The prototype should be developed quickly so it can be used during the development process. Usually, only the areas where the requirements are not clearly understood are prototyped. This means that a lot of desired functionality may be left out and quality assurance may be ignored. Also, nonfunctional requirements such as performance and reliability may be less stringent than they would be for the final product. Frequently, alternate technologies other than the ones used for the final software will be used to build the discovery prototypes. In these cases the prototypes are most likely discarded when the system has been finished. This "throwaway" approach is primarily used to gather information and develop ideas for the system concept. Many areas of a proposed system may not be clearly understood or some features may be a technical challenge for the developers. Creating discovery prototypes enables the developers as well as the users to better understand and refine the issues involved with developing the system. This technique minimizes the risk of a system being delivered that doesn't meet user needs or one that can't fulfill technical requirements.

Discovery prototyping has its advantages and disadvantages, which should be weighed against those of other fact-finding techniques for every fact-finding situation.

Advantages

- Allows users and developers to experiment with the software and develop an understanding of how the system might work.
- Aids in determining the feasibility and usefulness of the system before high development costs are incurred.
- Serves as a training mechanism for users.

FEASIBILITY STUDY

Feasibility - Is the measure of how beneficial or practical the development of an information system will be to an organisation.

Feasibility analysis - Is the process by which feasibility is measured.

* Remember: In analysis - Identify candidate solutions and ~~decide~~ make decision.
- the option are analyzed for operational, technical, schedule, and economic feasibility.

Four test of feasibility

1. operational feasibility.
   - Is the problem worth solving? or will the solution to the problem work?
   - Is the solution compliant with the laws and regulations?
   - Will the solution fulfil the users requirement?
   - How will the solution change the users work environment?
   - How do users feel about the proposed solution?

② Technical Feasibility -

- Is the proposed technology or solution practical?
- Do we currently posses the necessary technology?
- Do we possess the necessary technical expertise,
- Does the staff have the technical expertise to design and build this solution?

3. Schedule feasibility

- Given our technical expertise are the project deadlines reasonable?
  or
- Can the solution be designed and implemented within an acceptable time period?

4. Economic feasibility

- How much will the system cost?
- What benefits will the system provide?
  - tangible benefits
  - Intangible benefits.
- Is the proposed system cost-effective?

ethics

Cost-Benefit analysis Techniques

- Break-even analysis
- Cash flow analysis
- Return on Investment analysis
- Net present Value (NPV).

Economics

FACT FINDING

Objective - Fact finding ethics
- Fact finding methods or techniques.

What is Fact finding

Defn - Is a discovery stage where information is procured (using tools as questionnaires), verified and assembled in a report, with or without the recommendations of the investigator.

Fact Finding ethics (ethics - Ideals, moral principles)

Fact finding often brings Systems analysts into contact with sensitive information; Company plans, employee salaries or medical history, therefore it is important to do the following -

1. Protect Security and privacy of any facts or data.
2. Stop discussing Sensitive issues in public
3. Stop being careless with notes, documents - make sure they are kept safe.

*

Fact finding methods

1. Sampling of existing documentation, forms and databases

*studying existing documentation — When you are studying an existing system, you can develop a good feel for the system by studying existing documentations, forms and files — A good analyst always gets facts first from existing documentation rather than from people.

- The first document to collect is the organisation chart, — 2nd
- History that led to the project — the documents may include.
  - memoranda, studies, minutes, suggestion box notes, customer complaints, reports that document the problem area.
  - accounting records,
  - information systems project requests (past/present)

In addition — there are other documents that describe the business function being studied. They include.

- The company's mission statement and Strategic Plan.
- objectives of the organisation
- Completed forms that represent actual transactions at various pts.

- Standard operating procedures (SOPs), Job outlines
- samples of manual or computerized databases
- Samples of manual or computerized reports.

⇒ Analyst also needs to check documentation of previous system studies and design performed by analyst and consultants they may include —

* Previous Systems Studies

- ~~versions~~ flow charts and diagrams
- Design documentation (Input/output and databases
- Program documentation
- Computer operations manual and training manuals.

(*) As you review — take notes, draw pictures and use the SAD Tools.

(2) Research and Site visits =

Is to thoroughly research the problem domain- most problems are not unique, others have solved them before us. — organisations perform Site visits at companies they know have experienced similar problems. — If these companies are willing to share, valuable information can be obtained from them.

— Computer journals and reference books are also a good source of information they can provide information on how others have solved similar problems — or

* some have used existing packages to solve them problems.

Summary

— thoroughly research the problem domain
— Use the internet to browse or
Use the library to know more
—

Observation of the work environment ⑤

Observation is an effective data collection technique for obtaining and understanding of the system.

Def - Is a fact-finding technique wherein the systems analyst either participates in or watches a person perform activities to learn about the system.

- It is used when validity of data collected through other methods is in question, or when processes are complex and cannot be explained by users.

Note that - observation can be useful technique provided you have the ability to observe thoroughly and accurately.

Advantages of observation

1. Reliability
2. Systems analyst is able to see exactly what is being done.
3. relatively inexpensive compared to other fact finding techniques

Disadvantages of observation:

1. People are uncomfortable when watched (may perform differently - 'eye service')
2. ~~The work being observed may not involve the level of difficulty or volume~~
2. The tasks being observed are subject to various types of interruptions.
3. ~~Does not~~ May do it right when observed, even if the standard procedures are violated. — In other words - people may let you see what they want you to see.

Guidelines for observation

- determine how data will be captured,
- Conduct observation at when workload is normal, during peak periods, and low periods. (eg Online Registration process, or Payment process)

Questionaires :-

Questionaires are Special-Purpose documents that allow the analyst to collect information and opinions from respondents.

- The document can be mass-produced and distributed who can then complete the questionaire on their own time.
- Questionaires allow the analyst to collect facts from a large number of people while maintaining uniform responses.
- Questionaires are used when dealing with a large audience.

Advantages

1. Most questionaires can be answered quickly
2. Questionaires provide a relatively inexpensive means for gathering data from large no of individuals
3. Responses can be tabulated and analyzed quickly.

Disadvantages

1. There is no gurantee that an individual will answer or expand on all the questions
2. Its not possible for the systems analyst to observe and analyze the respondent's body language.
3. No opportunity to clarify — an in complete answer
4. Well questionaires are difficult to prepare

Types of questionaires

① Free-format questionaires
- the respondent is allowed to write the answer in the space provided.

② . Fixed-Format Questionaires
- the respondent must choose from the available answers.

1- Multiple-choice questions

2. Rating Questions - (eg Strongly agree, Agree.

3. Ranking Questions - Refer to notes.

⑤ - **Interviews** — The personal interview is generally recognised as the most important and most often used fact-finding techniques. — It is a technique whereby the systems analysts collect information from individuals through face-to-face interaction.

* Note that to use interviewing technique we must possess good human relations skills for dealing effectively with different types of people.

Advantages

1. It allows the systems analyst to probe for more feedback from the interviewee.
2. It gives analyst opportunity to observe the interviewee's nonverbal communication (body language).

Disadvantages

1. Interviewing is a very time-consuming, and therefore costly fact-finding approach.
2. The success of the interviews is highly dependendent on the systems analysts human relation skills

How to conduct Interview

1. Select Interviewees. - Use organisational ~~es especially~~ Chart to identify end users of the Information System in question.
2. make appointment / get supervisors approvals.
3. Never conduct an interview in the presense of your office mates.
4. Dress properly ⟹ corporate is acceptable -

Do's and Don'ts

Do

1- listen careful
- maintain control
- observe body language
- Be Patient
- Keep Interviewee at ease
- maintain self control
- Dress properly.

Avoid

- long interviews
- Talking instead of listening
- tape recording

Read

1. Prototyping
2. Joint requirement planning