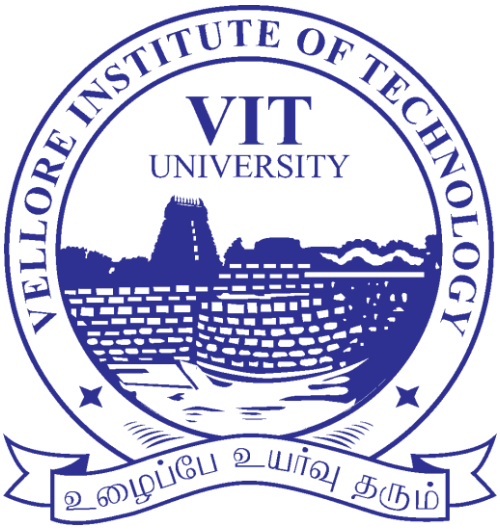

School of Information Technology and Engineering

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Software Project Management

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15.Monitoring Project
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1. **Overview**:

   System for Biometric authorization of voters, With this project we aim to solve some of the issues caused by traditional way of authenticating voters, like Identity theft, fake votes which in turn gives an unfair advantage to a particular party.
   Also we integrate voter number with Aadhar card so that, one centralized is used to authenticate the voters, no hassle of separate voter ID cards.
   Proposed project, will access authenticate by Biometric scanning of the voter, after the biometric is matched and verified voter is permitted to cast his/her vote, using traditional EVMs and then voters will be marked by indelible ink.
   Upon successful casting of vote, the voter will be marked voted and hence will not be allowed to vote again.

2. **Activities carried out by Software Project Management:**

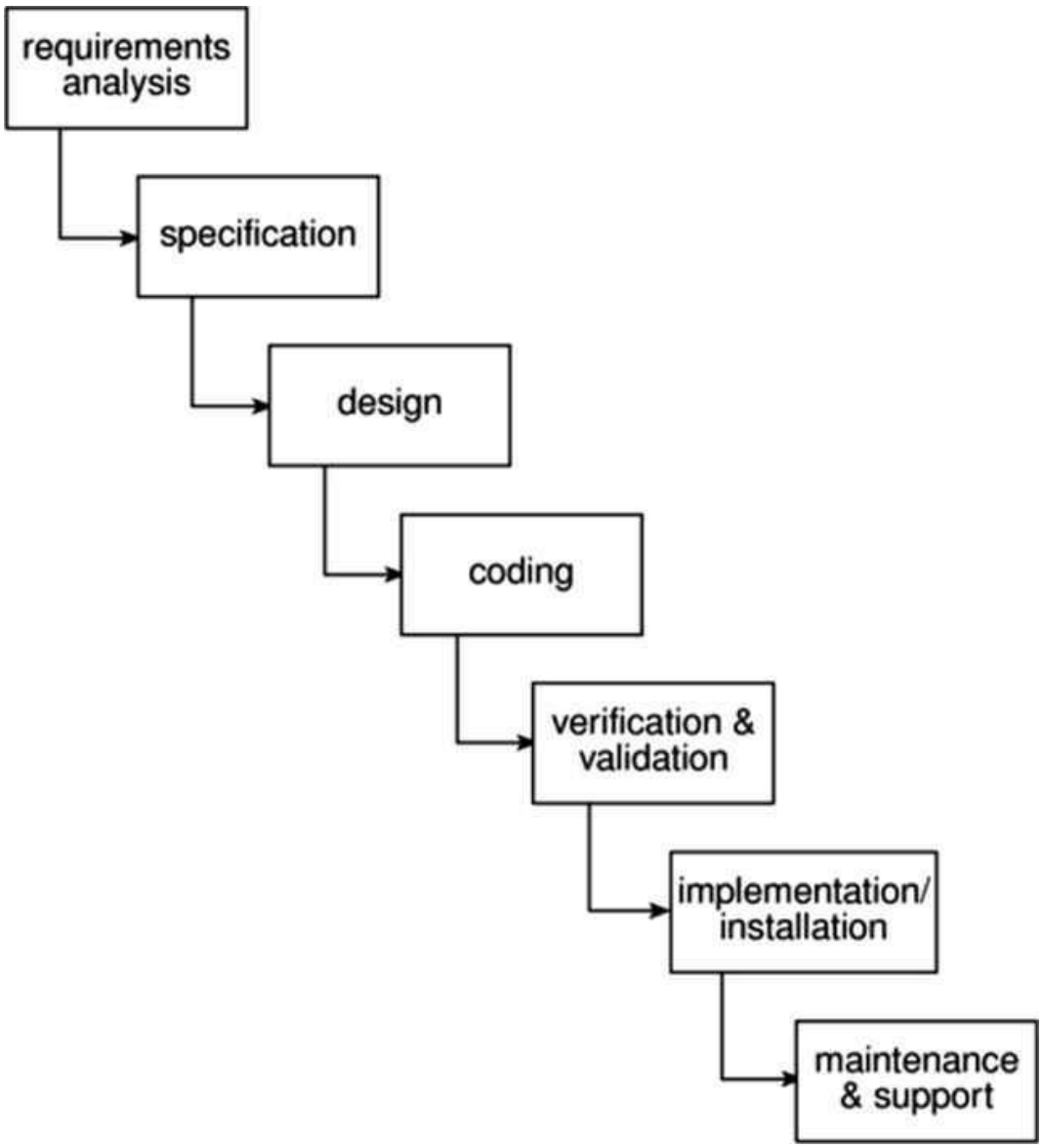
   Usually, there are three successive processes that bring a new system into being:

   l. Feasibility study: This is an investigation to decide whether a prospective project is worth starting. Information will be gathered about the general requirements of the proposed system. **This evaluation will be done as a part of Strategic Planning exercise**.

   II. Planning: If the feasibility study produces result that indicate that the prospective project appears viable, then planning of the project can take place.

   III. Project execution: The project can then be executed. Individual projects are likely to differ considerably but a classic project life-cycle is shown in Figure

3. Product Lifecycle:



a) <u>Requirement Analysis and Specification:</u>

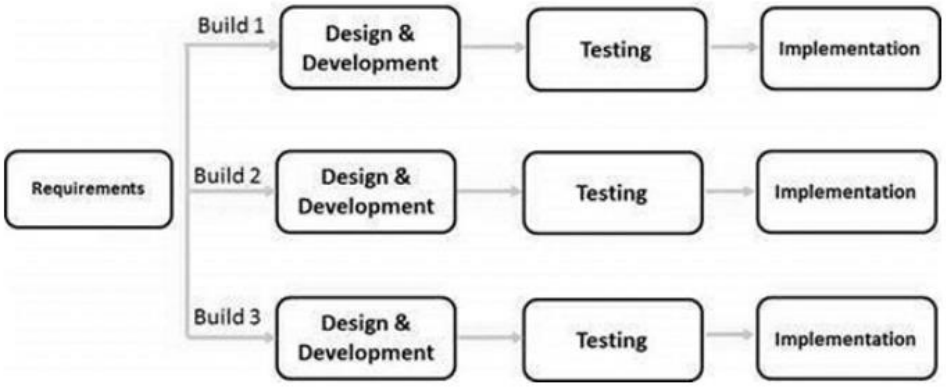
User has come up with following requirements:

- ✧ System that is more secure,
- ✧ System to authenticate the voter quickly.
- ✧ Authenticate from a centralized UIDAIs database.

- ✧ Should support large number of users at a time.
- ✧ Not to allow user to vote again.
- ✧ Simple User Interface and User experience.

b) Design:

We propose the use of ITERATIVE MODEL. Iterative process starts with a simple implementation of a subset of the software requirements and iteratively enhances the evolving versions until the full system is implemented. At each iteration, design modifications are made and new functional capabilities are added. The basic idea behind this method is to develop a system through repeated cycles (iterative) and in smaller portions at a time (incremental).



c) Coding:

New software will be built by scratch using Java programming language, which will fetch voters information and authenticate with the UIDAIs database.

d) Verification and Validation:

- ➢ **Verification** will be done to check whether the product is built according to specifications given, and meets all the quality

requirements. It's an internal process, Quality control department checks the product. Done as part of Quality control. (PMBOK – Control Quality process)

- **Validation** will be done to check whether the product built is acceptable to the customers or not, i.e checking whether product meets the customer needs or not. It is an external process. Customer checks the product before accepting. Done as part of scope validation. (PMBOK – Validate scope process)

e) Implementation:

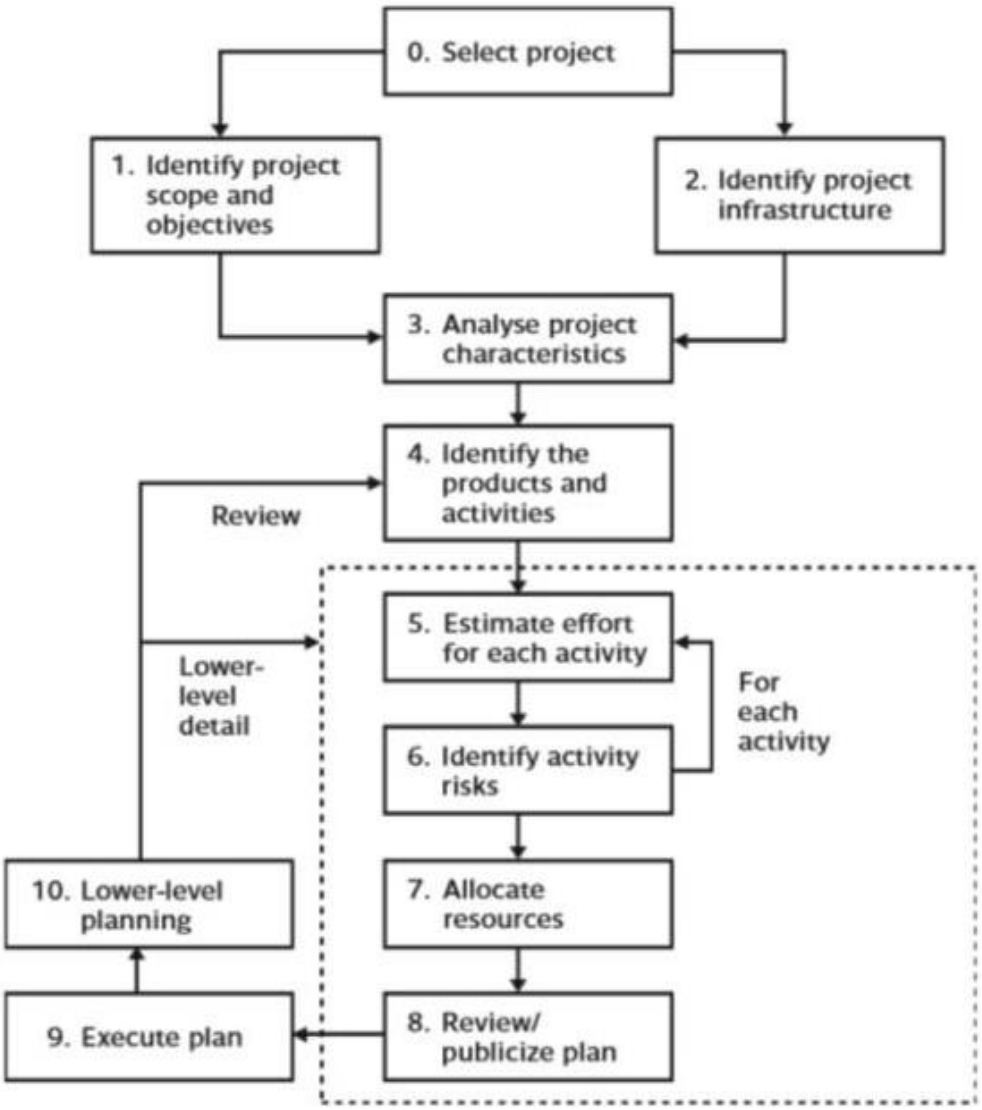
This system will be implemented in phases, Dividing India into five parts Central, Southern, Eastern, Western, Northern part. System will be initially installed in some parts of Central India. Based on its reports changes will be implemented and further phases the changes will be implemented.

4. Stakeholders:

Stakeholders are individuals who either care about or have a vested interest in your project. They are the people who are actively involved with the work of the project or have something to either gain or lose as a result of the project. When you manage a project to add lanes to a highway, motorists are stakeholders who are positively affected.

- Government of India
- Election Commission
- UIDAI
- Citizens
- Biometric Machine enabler
- Elections
- Requirements Engineer
- Software Architect
- Project Manger

5. **Stepwise Project Planning**:



Steps in Project Planning:

- Step 0: Select project
- Step 1: Identify project scope and objectives
- Step 2: Identify project infrastructure
- Step 3: Analyze project characteristics
- Step 4: Identify project products and activities
- Step 5: Estimate effort for each activity.
- Step 6: Identify activity risks.
- Step 7: Allocate resources
- Step 8: Review / Publicize plan
- Step 9 & 10: Execute plan/lower level of planning

1. **Step 0: Select the project:**
   - The project selected is **System for Biometric authorization of voters,** this is a system that would eradicate the use of voter ID instead integrate Voter number with Aadhar card so that one can use his/her biometric to authenticate and cast vote.

2. **Step 1: Identify the project scope and objectives:**
   - The objective of project is to minimize the use of voter ID, Integrate the voter number into Aadhar for quick and secure authentication.
   - Its main aim is to eradicate identity theft that leads to fake votes.
   - Stakeholders Identified:
     - Government of India
     - Election Commission
     - UIDAI
     - Citizens
     - Biometric Machine enabler
     - Requirements Engineer
     - Software Architect
     - Project Manger.

3. **Step 2: Identify project infrastructure.**
   a) Technology infrastructure consists of hardware systems, software, network connections, and servers.
      i. UIDAI server would be used to authenticate users.
      ii. We would also need a server to check whether the person has casted vote.
      iii. Decent internet connection would be needed.
      iv. In terms of hardware, at least 4GB RAM and 256GB internal storage with continuous power supply would be needed.
4. **Step 3: Analyze project characteristics**
   a) The general purpose of this part of planning operation is to ensure that the appropriate methods are used for the project.
      i. Authenticate user, using biometric scanner.
      ii. Check voter's details with UIDAI's server.
      iii. After verification, allow voter to cast vote.
      iv. Voter cannot cast vote if already voted.

5. **Step 4: Identify project products and activities**
   a) System for Biometric authorization of voters, is the identity of the product.
   b) Purpose of the product is to authenticate voters with the help of their biometric information.
   c) Product will be developed using java programming language.
   d) It aims to centralize, make single identification ID like AADHAR rather than having different decentralized IDs.

6. **Step 5: Estimate effort for each activity**
   a) There are many modules we would work on, some of which has higher priority based on requirement elicitation.
      i. Verification of Voters biometric details: **Highest Priority**.
      ii. Permit voter to cast vote: **High Priority**.
      iii. After one casts vote, Mark him/her voted: **High Priority.**
      iv. Don't allow voter to cast vote more than one: **High priority.**
      v. UI and UX : **Low Priority.**
7. **Step 6: Identify activity risks**

a) Failure to authenticate user's information from UIDAI's server, due to network and server issues.
b) Permit voters to vote repeatedly.
c) Doesn't allow voters to cast vote.

8. **Step 7: Allocate Resources**
   a) Each task requires resources in order to be successfully performed. As a minimum, most tasks require a human resource to carry out some actions. Usually, the person starts with some input materials which are used to produce an output.
      i. Access to UIDAI's server to authenticate voter's details.
      ii. A database to store the details of voters, who have casted vote.
      iii. Biometric scanner, to scan the biometrics of the voter.

9. **Step 8: Review and Publicize plan**
   a) All module design documentation has to be reviewed by the group of developers assigned by Election commission of India, before coding of that module starts taking place. To ensure all requirements are met.

10. **Step 9: Execute plan & Step 10: Lower-level Planning**
    a) Project plan is made and implemented, required domains people are assigned task by project manager.
    b) Modules that are independent are given more priority in terms of testing.

6. Strategic Assessment

Strategic planning is defined as an organization's process of defining its strategy, or direction and making decisions on allocating its resources to

pursue this strategy, including its capital and people

• Issue – 1: objectives: – How will the proposed system contribute to the organization's stated objectives? How, for example, might it contribute to an increase in market share?
• Issue – 2: is plan – How does the proposed system fit in to the IS plan? Which existing system (s) will it replace/interface with? How will it interact with systems proposed for the later development?
• Issue – 3: organization structure: – What effect will the new system have on the existing departmental and organization structure? – For example, a new sales order processing system overlap existing sales and stock control functions?
• Issue – 4: MIS: – What information will the system provide and at what levels in the organization? In what ways will it complement
• Issue – 5: personnel: – In what way will the system proposed system affect manning levels and the existing employee skill base? What are the implications for the organization's overall policy on staff development?
• Issue – 6: image: – What, if any, will be the effect on customer's attitudes towards the organization? Will the adoption of, say, automated system conflict with the objectives of providing a friendly service?

Issue – 1	Objectives	Our project meets the goal of removing electoral malpractices.
Issue – 2	Is Plan	The existing AADHAR Identification system will be used feasibly.
Issue – 3	Organization Structure	The proposed Voting system will ease the process of Voting in India.
Issue – 4	MIS	The Voting system will provide biometric identification of voter.
Issue – 5	Personnel	The system will help in reducing the use of human resource and will provide a more automated system of voting.
Issue – 6	Image	It will maintain the integrity of the voting procedures. The system will instill faith in voting among voters.

7. Technical Assessment

Technical assessment of a proposed system evaluates functionality against available:

- Hardware
- Software

Hardware assessment:

1. This project will require the use of biometric fingerprint and retina scanning devices.
2. The use of the monitor to display voter's details at the election booth, is also required.

Software assessment:

1. The voter information is limited to the type of data supported by the existing AADHAR Database.
2. The system will be supported on all Windows based platforms.

8. Cost Benefit Analysis

The most common way of carrying out an assessment of a proposed information system, or other development, is by comparing the expected costs of development and operation of the system with the benefits of having it in place.

a) Net profit

Calculated by subtracting a company's total expenses from total income.
NET PROFIT=TOTAL COSTS-TOTAL INCOME
The table below shows the estimated investment and return for the first 6 years of the project after its investment:

YEAR	PROJECT COSTS
0	-1,00,00,000
1	10,00,000
2	10,00,000
3	20,00,000
4	20,00,000
5	40,00,000
6	20,00,000

NET PROFIT= -
1,00,00,000+10,00,000+10,00,000+20,00,000+20,00,000+40,00,000+20,00,000

=20,00,000

b) Payback Period

The payback period is the time taken to recover the initial investment.

YEAR	PROJECT COSTS	PAYBACK
0	-1,00,00,000	-1,00,00,000
1	10,00,000	-90,00,000

2	10,00,000	-80,00,000
3	20,00,000	-60,00,000
4	20,00,000	-40,00,000
5	40,00,000	0000000
6	20,00,000	20,00,000

It takes 5 years to recover from the initial investment. Therefore, payback period is 5 years

c) Return On Investment

It provides a way of comparing the net profitability to the investment required.
Average annual profit= 20,00,000/6

ROI=((20,00,00/6)/1,00,00,000)*100=3.33%

d) IRR (Internal Rate Return)

The IRR compares returns to costs by asking: "What is the discount rate that would give the cash flow stream a net present value of 0?"

YEARS	0	1	2	3	4	5	6
CASE A							
NET CASH	-1000000	10,00,000	10,00,000	20,00,000	20,00,000	40,00,000	20,00,000

FLOWS	0						
IRR	5%						

9. Risk Evaluation

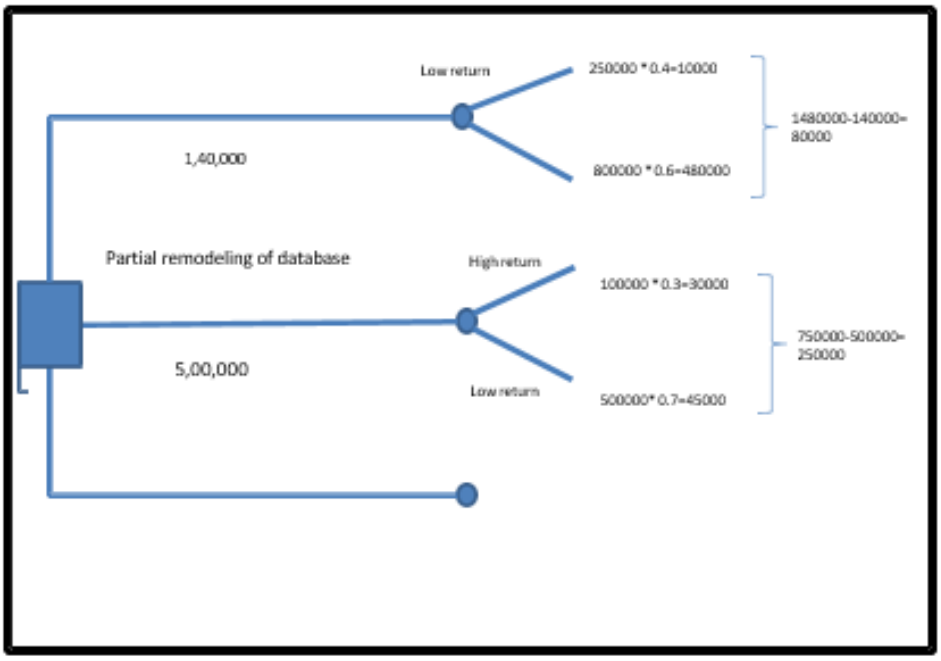
Every project involves risk of some form. When assessing and planning a project, we are concerned with the risk of the project not meeting its objectives.

Risk assessment matrix:

RISK	IMPORTANCE	LIKELIHOOD
• Software never completed or delivered	High	Low
• Project cancelled after design stage	High	Low
• Software delivered late	Medium	Medium
• Development budget exceeded <=20%	Low	Medium
• Development budget exceeded <=20%	Medium	Low
• Maintenance costs higher than estimated	Low	Low

Our project uses the AADHAR UIDIA Database to access the biometric information of Voters.

As project managers we can either propose **complete remodeling of the database** or **partial remodeling of the database** or **to stay as is.**



Partial remodeling of database is more beneficial.

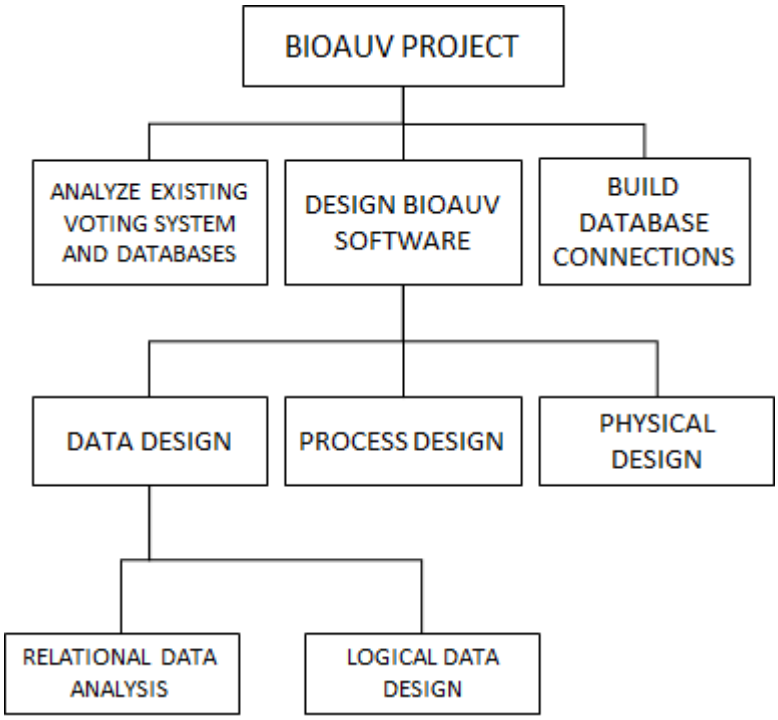
10. Project Scheduling

A project schedule is a detailed project plan showing dates when each acitvity should start and finish and when and how much each resource will be required. It consists of four main stages:

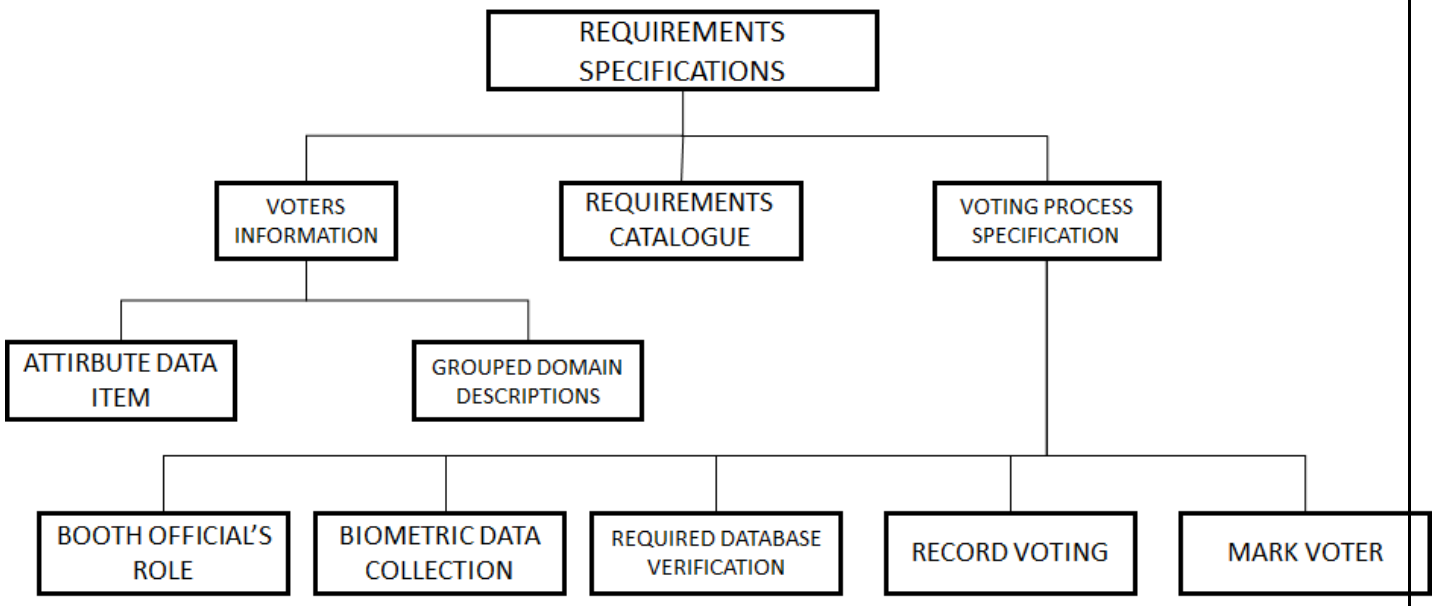
1. Constructing an activity plan
2. Risk analysis
3. Resource allocation
4. Schedule production

Work Breakdown Structure

Involves identifying the main tasks required to complete a project and then breaking each of these down into a set of lower- level tasks.



PRODUCT BASED APPROACH



11. Activity Management

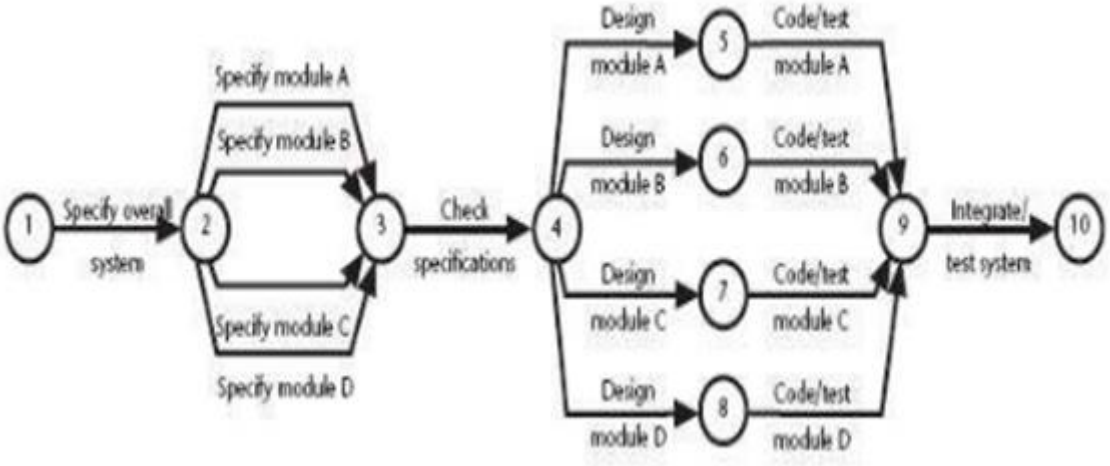
Defining project and activities

- A project is composed of a number of interrelated activities.
- A project may start when at least one of its activities is ready to start.
- A project will be composed when all of the activities it encompasses have been completed
- An activity must have a cleared defined start and a a clearly defined end-point
- If an activity requires a resource then that resource requirement must be forecastable
- The duration of an activity must be forecastable
- Some activities might require that others are completed before they can begin

Activity-On-Arrow

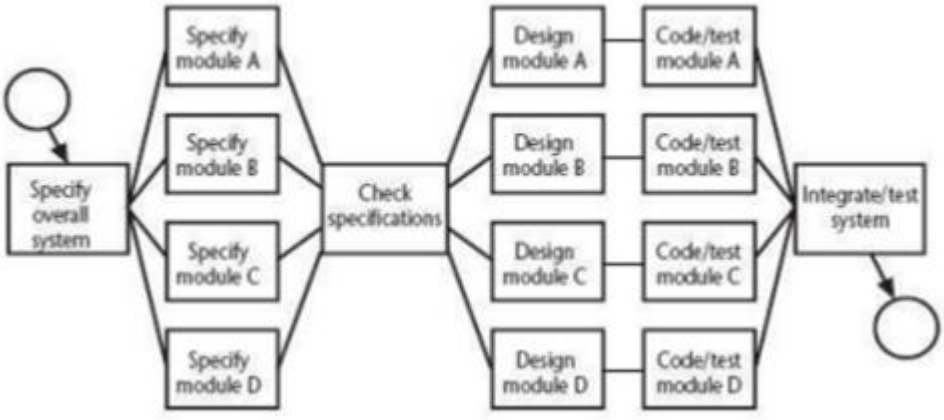
Used by CPM(Critical Path Method) and PERT (Program Evaluation Review Technique) to visualize the project as a network.

- · Activities are drawn as arrow joining circles , or nodes, which represent the possible start and/or completion of an activity or set of activities



Activity-On-Node

- User by precedence networks
- Has become popular
- Widely adopted
- Activities are represented as nodes
- The links between nodes represent precedence (or sequencing)requirements.



Methods used for networking

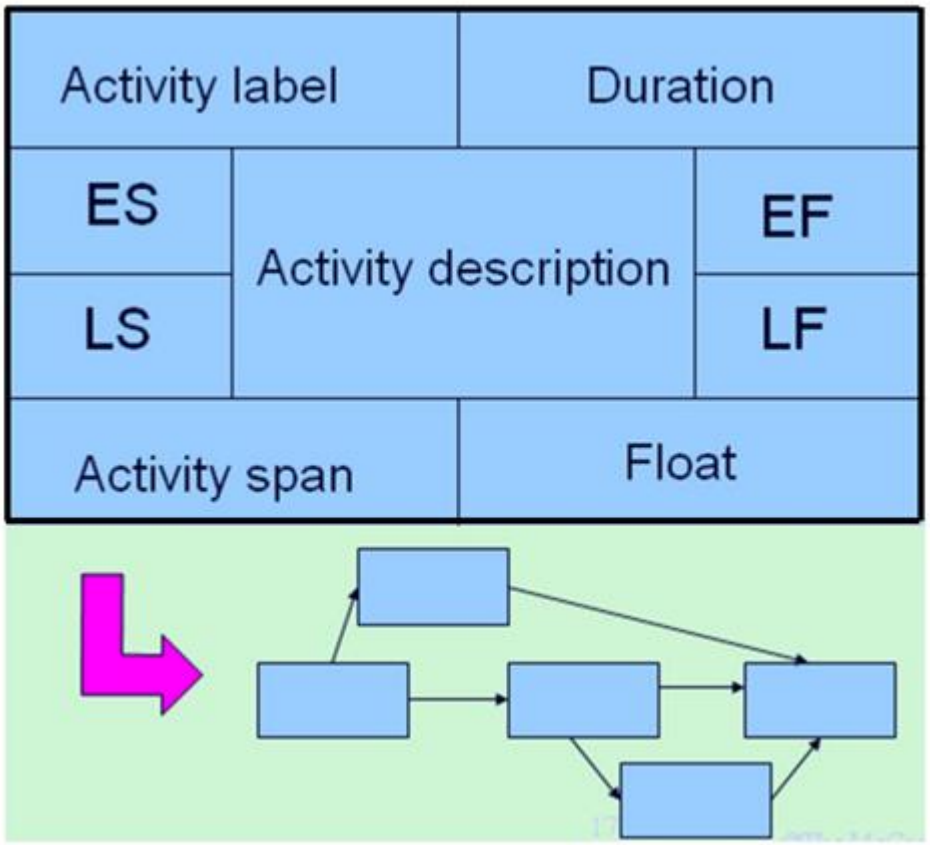
1. PERT(Program Evaluation and Review Technique)
2. CPM (Critical Path Method)

Managing a project with networking planning method involves four steps

- Describing the project
- Diagramming the network
- Estimating time of completion
- Monitoring project progress

Constructing Precedence network for Biometric System for Voters System

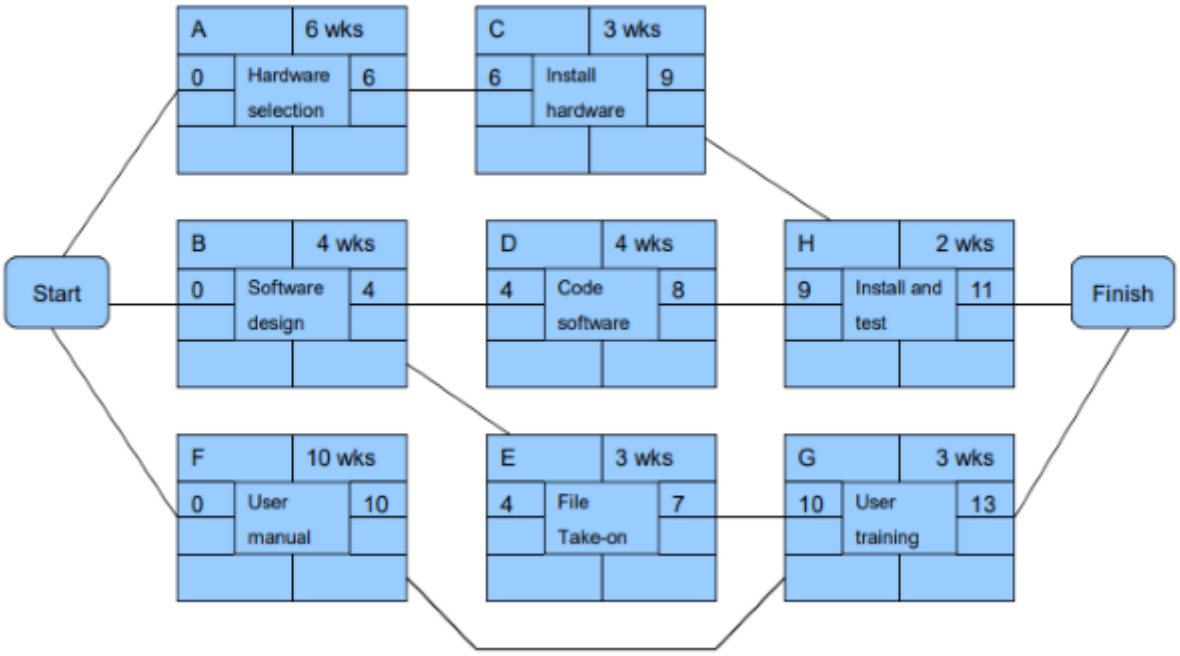
- Notation



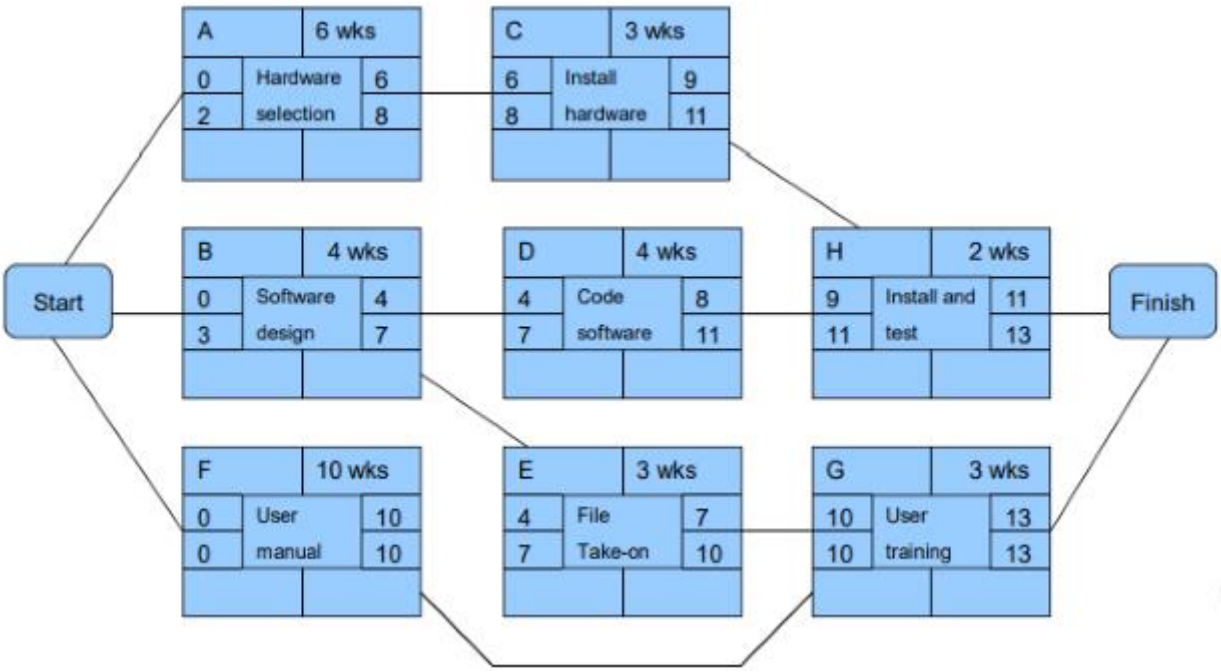
Project specification with estimated activity durations and precedence requirements

ACITIVITY	DURATION(WEEKS)	PRECEDENCE
A Hardware selection	6	
B Software design	4	A
C Biometric devices installation	3	B
D Code and test software	4	B
E Distribute software	3	
F Write user manuals	10	
G Train booth officials	3	E,F
H Install and test system	2	C,D

Forward pass:

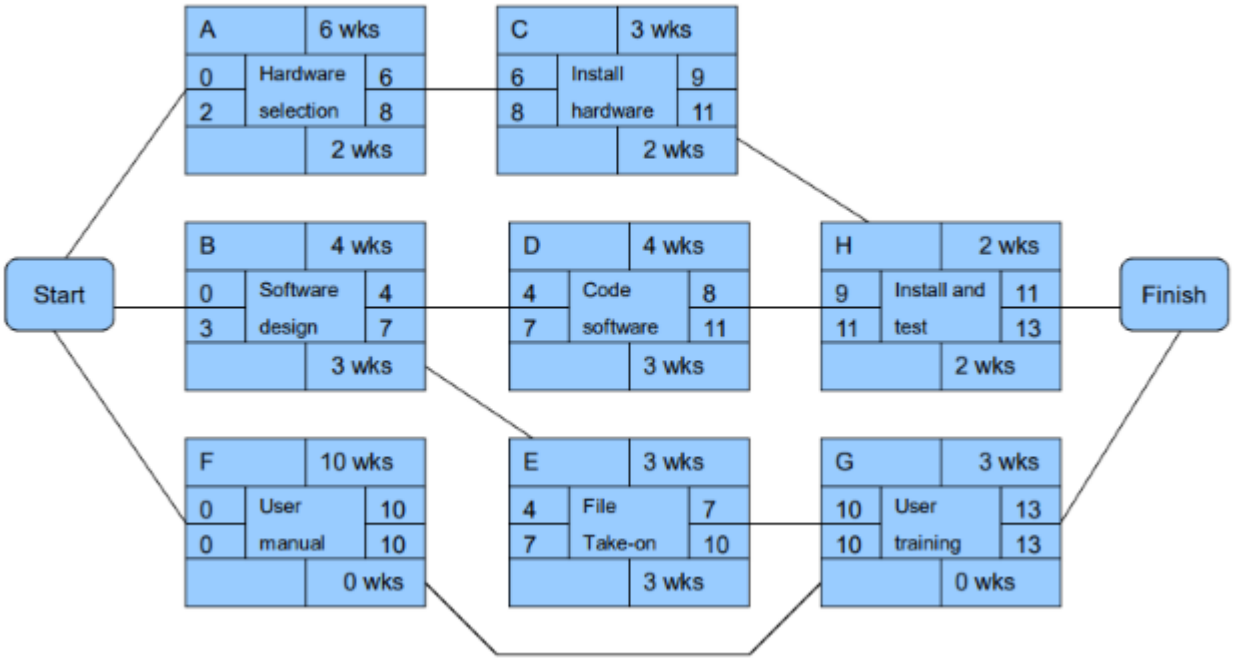


Backward pass:



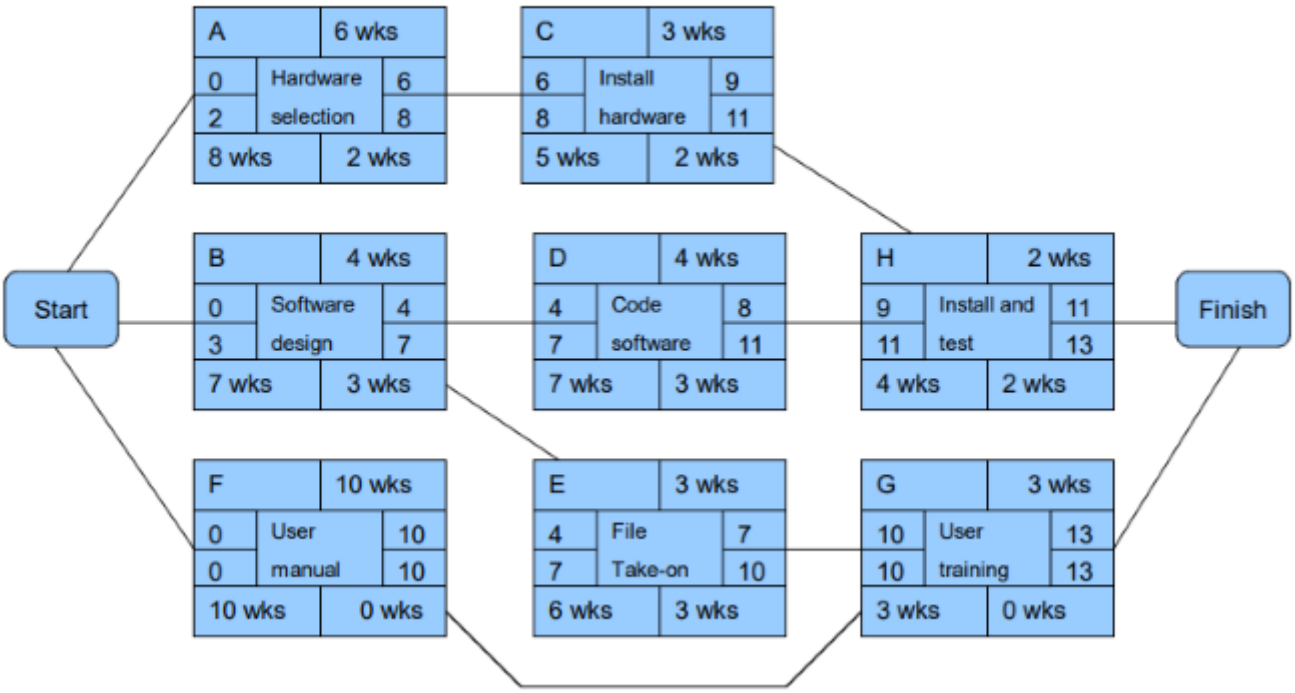
Float:

Float=ES-LS



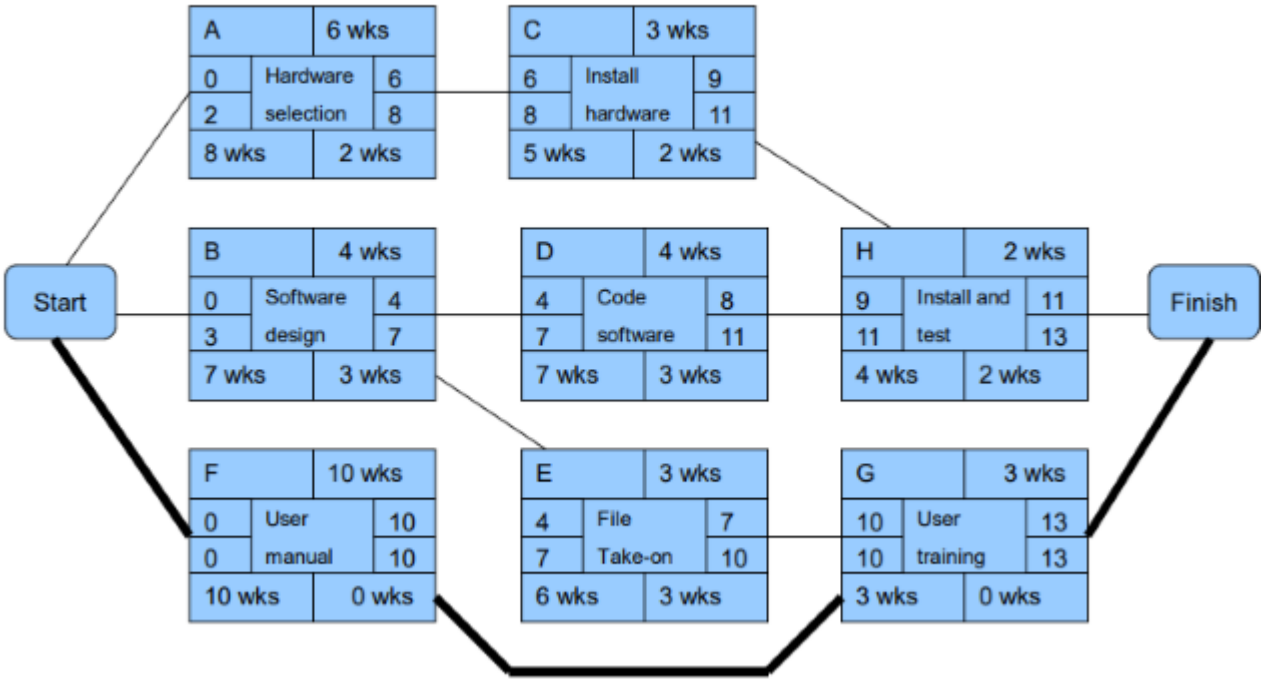
Activity span:

Activity span=LF-ES



Critical path:

- The path which defines the duration of the project.
- Note the path through network with zero floats
- Critical path: any delay in an activity on this path will delay whole project



Advantages of CPM:

1. Helpful for scheduling, monitoring, and controlling projects. The activities and their outcomes can be shown as a network
2. CMP determines the project duration, which minimized the sum of direct and indirect costs
3. Evaluates which activities can run parallel to each other.
4. Displays dependencies to help scheduling

Disadvantages of CPM:

1. CPM's can be complicated, and complexity increases for larger

projects

2. Does not handle the scheduling of personnel or the allocation of resources

3. The critical path is not always clear and needs to be calculated carefully

4. Estimating activity completion times can be difficult

12. Risk Management

What is a Risk?

A Risk is an uncertain event or condition that occurs in a project which has a positive or negative effect on the overall project objectives.

Risk Categorization

Project risks

1. They threaten the project plan
2. If they become real, it is likely that the project schedule will slip and that costs will increase

Technical risks

1. They threaten the quality and timeliness of the software to be produced
2. If they become real, implementation may become difficult or impossible

Business risks

1. They threaten the viability of the software to be built
2. If they become real, they jeopardize the project or the product.

Approach

Known risks
1. Those risks that can be uncovered after careful evaluation of the project plan, the business and technical environment in which the project is being developed, and other reliable information sources (e.g., unrealistic delivery date)

Predictable risks
1. Those risks that are extrapolated from past project experience
(e.g., past turnover)

Unpredictable risks
1. Those risks that can and do occur, but are extremely difficult to identify in advance.

Steps for risk management are followed

Primary objective is to avoid risk and to have a contingency plan in place to handle unavoidable risks in a controlled and effective manner

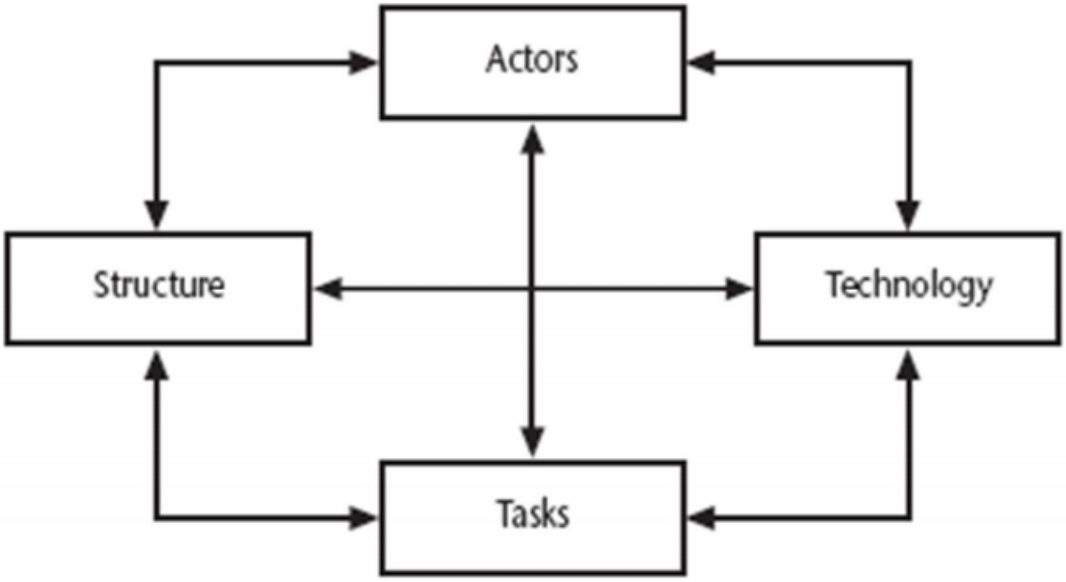
1. Identify possible risks; recognize what can go wrong

2. Analyze each risk to estimate the probability that it will occur and the impact (i.e., damage) that it will do if it does occur

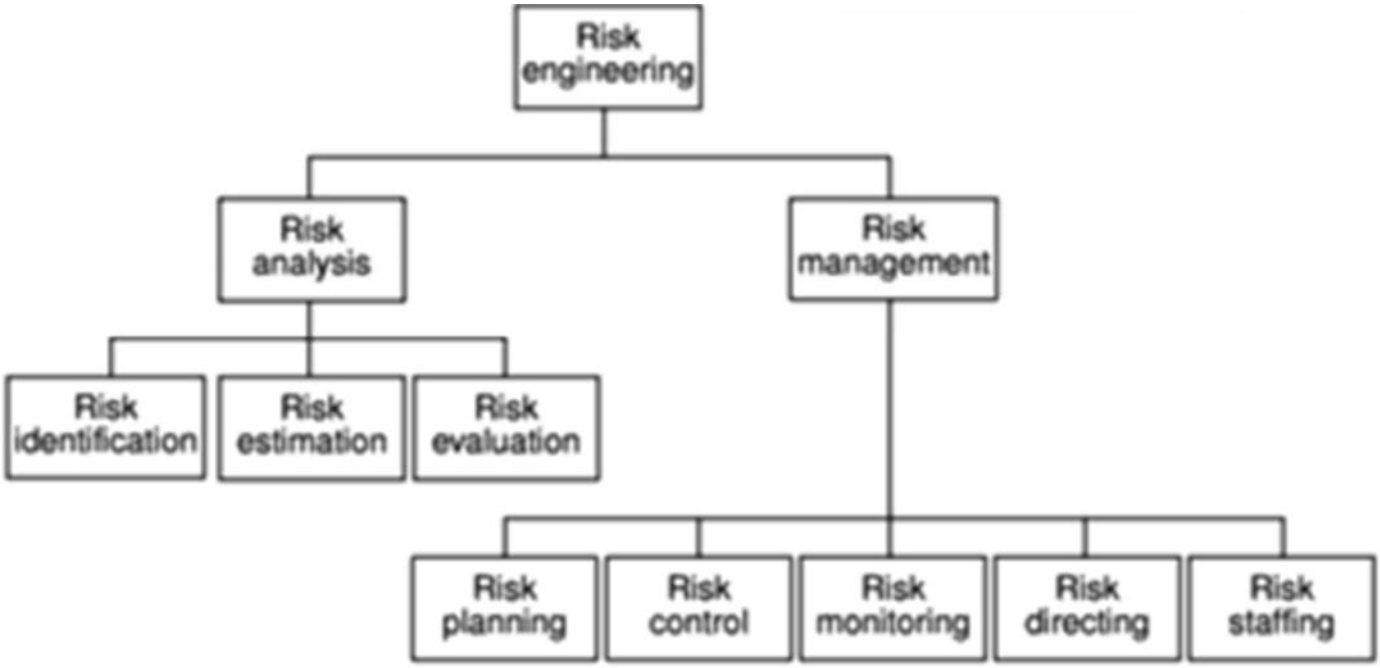
3.Rank the risks by probability and impact - Impact may be negligible, marginal, critical, and catastrophic

4. Develop a contingency plan to manage those risks having high probability and high impact

Sociotechnical Model of Risk Categorization



Barry Boehm's Risk Engineering



A framework for dealing with risk

The planning for risk includes these steps:

- Risk identification – what risks might there be?
- Risk analysis and prioritization – which are the most serious risks?
- Risk planning – what are we going to do about them?
- Risk monitoring – what is the current state of the risk?

Factors to consider in risk identification

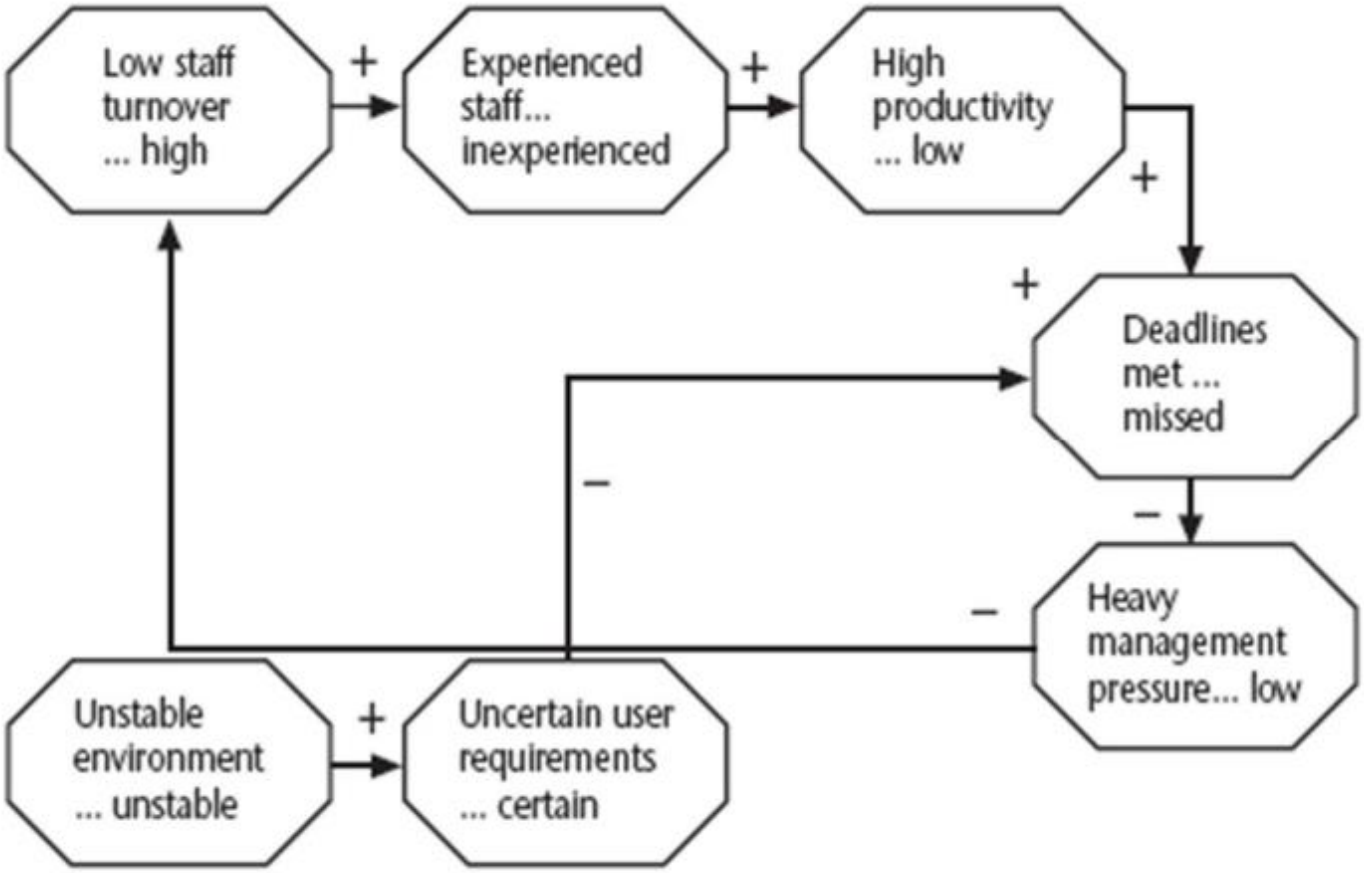
- Application Factors
- Staff Factors
- Project Factors
- Project Method
- Hardware and Software Factors
- Change Factors
- Supplier Factors
- Environmental Factors
- Health and Safety Factors

Risk identification

Approaches to identifying risks include:

- Use of checklists – usually based on the experience of past projects
- Brainstorming – getting knowledgeable stakeholders together to pool concerns
- Causal mapping – identifying possible chains of cause and effect.

Causal mapping



Reducing the risks

- Hazard prevention
- Likelihood reduction
- Risk avoidance
- Risk transfer
- Contingency planning

Known and Predictable Risk Categories

Product size – risks associated with overall size of the software to be built

Business impact – risks associated with constraints imposed by management or the marketplace

Customer characteristics – risks associated with sophistication of the customer and the developer's ability to communicate with the customer in a timely manner
Process definition – risks associated with the degree to which the software process has been defined and is followed

Development environment – risks associated with availability and quality of the tools to be used to build the project

Technology to be built – risks associated with complexity of the system to be built and the "newness" of the technology in the system

Staff size and experience – risks associated with overall technical and project experience of the software engineers who will do the work

Boehm's top 10 development risks

Risk	Risk reduction techniques
Personnel shortfalls	Staffing with top talent; job matching; teambuilding; training and career development; early scheduling of key personnel
Unrealistic time and cost estimates	Multiple estimation techniques; design to cost; incremental development; recording and analysis of past projects; standardization of methods
Developing the wrong software functions	Improved software evaluation; formal specification methods; user surveys; prototyping; early user manuals

Developing the wrong user interface	Prototyping; task analysis; user involvement
Gold plating	Requirements scrubbing, prototyping, design to cost
Late changes to requirements	Change control, incremental development
Shortfalls in externally supplied components	Benchmarking, inspections, formal specifications, contractual agreements, quality controls
Shortfalls in externally performed tasks	Quality assurance procedures, competitive design etc
Real time performance problems	Simulation, prototyping, tuning

Risk prioritization

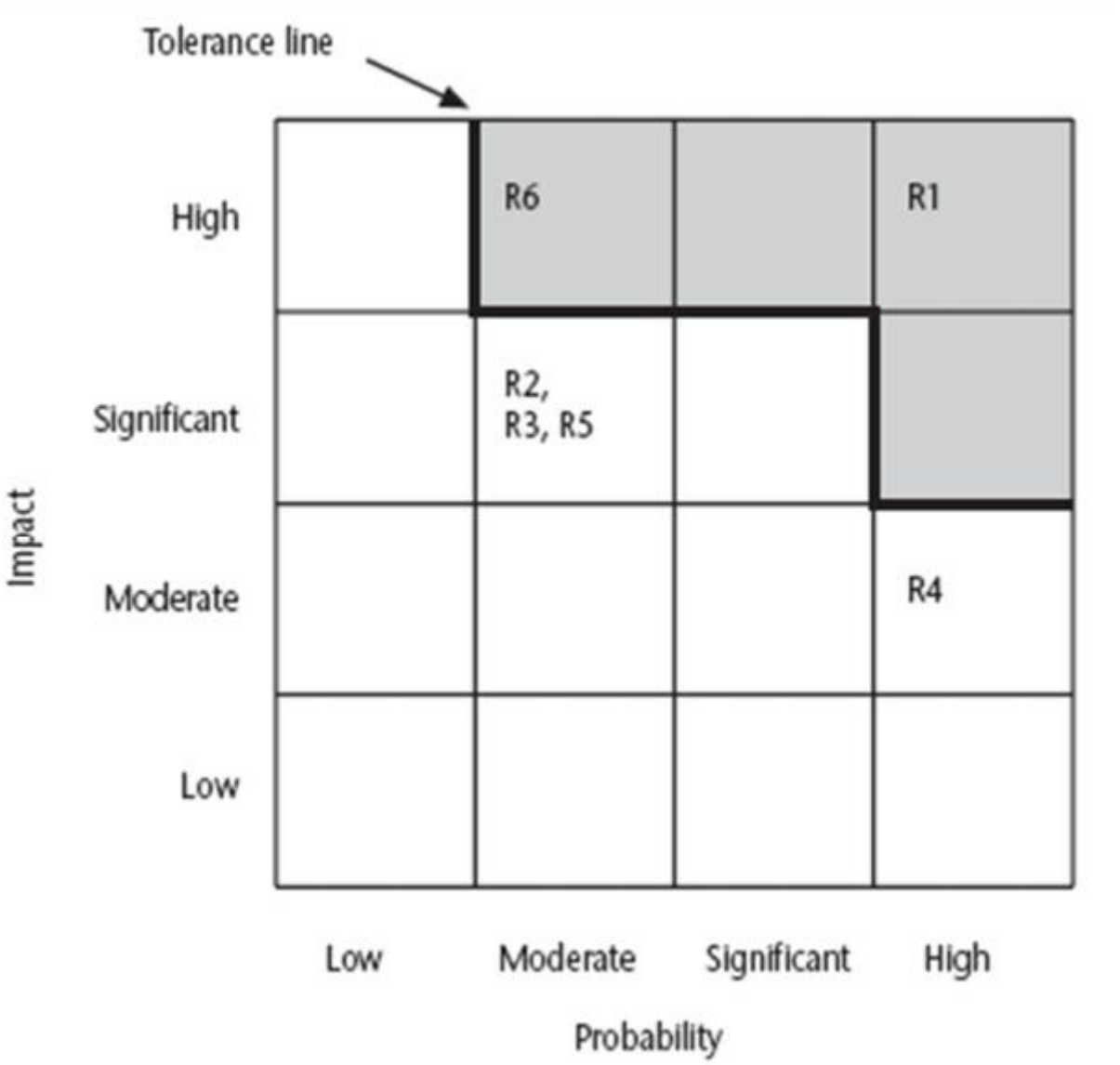
Risk exposure (RE)= (potential damage) x (probability of occurrence)

Risk exposure assessment for our system

	Hazard	**Likelihood**	**Impact**	**Risk exposure**
R1	Technical Glitches	9	9	81
R2	Database Failure	4	5	20
R3	Detection problem	5	6	30
R4	People with burn fingers and scratches	9	3	27
R5	Hardware issues	3	6	18

R6	Biometric machine not working	4	8	32

Probability impact matrix



Risk probability: qualitative descriptors

Probability level	Range
High	Greater than 50% chance of happening
Significant	30-50% chance of happening
Moderate	10-29% chance of happening
Low	Less than 10% chance of happening

Qualitative descriptors of impact on cost and associated range

values

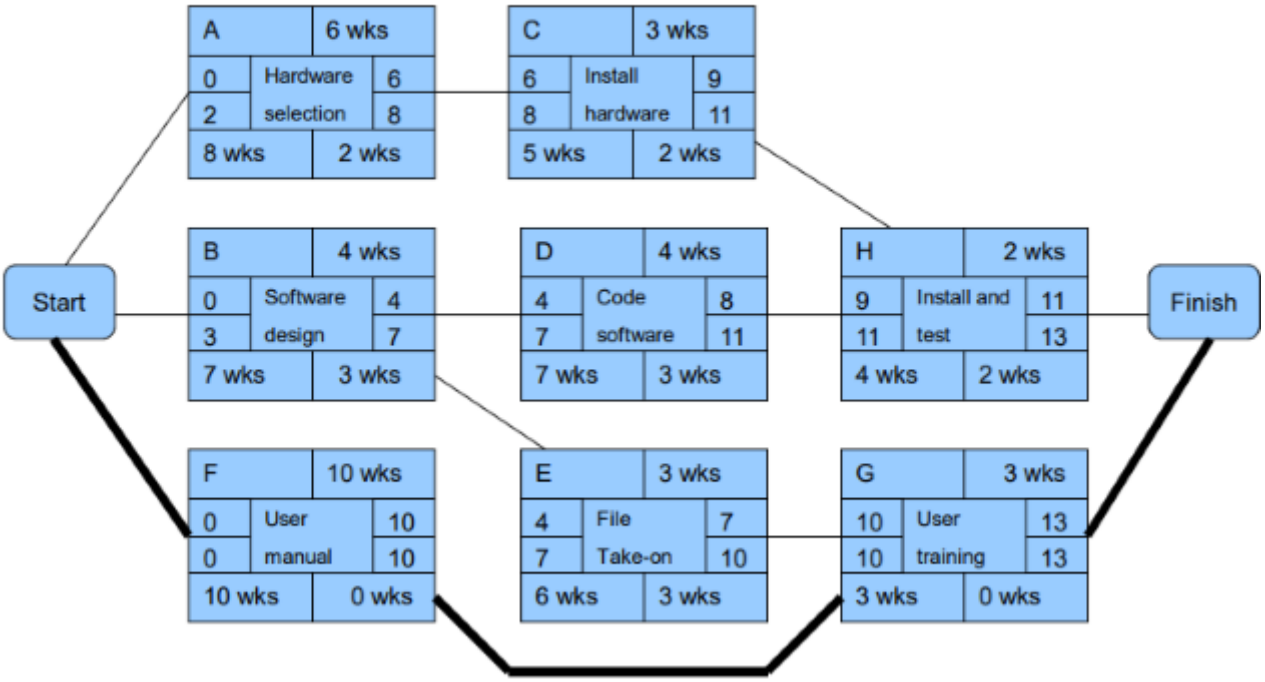
Impact level	Range
High	Greater than 30% above budgeted expenditure
Significant	20 to 29% above budgeted expenditure
Moderate	10 to 19% above budgeted expenditure
Low	Within 10% of budgeted expenditure.

13. Resource Allocation

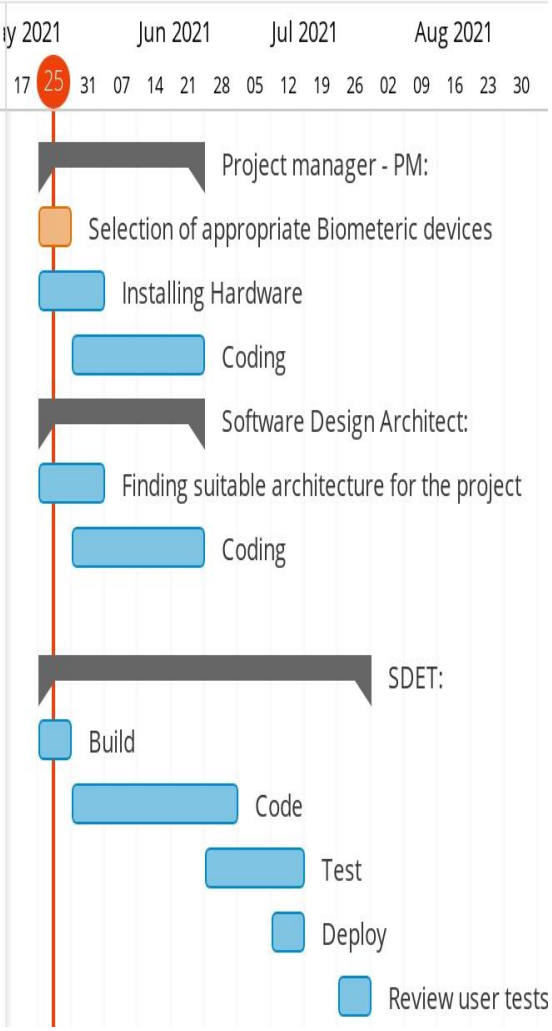
Resource allocation is used to assign the available resources in an economic way.

Identifying Resource requirements:

Activity	Resource	Notes
Hardware Selection	Project manager	approx 6 weeks
Installing hardware	Project manager	approx 3 weeks
Software Design	Software Architect	approx 4 weeks
Code the software	SDET, SA, PM	approx 4 weeks
Build & Testing	SDET	approx 2 weeks
Documentation	Project manager	approx 10 weeks
Alpha testing	SDET	approx 3 weeks
Beta testing	Government officials	approx 3 weeks
User training	Government officials	approx 3 weeks



	ACTIVITIES	ASSIGNEE	EH	START	DUE	%
	Project manager - PM:		24h	25/May	26/Jun	0%
1	Selection of appropriate Bio...	Sabrina - PM	9h	25/May	30/May	0%
2	Installing Hardware	Sabrina - PM	9h	30/May	31/May	0%
3	Coding	Sabrina - PM	6h	01/Jun	26/Jun	0%
	Software Design Architect:		14h	25/May	26/Jun	0%
5	Finding suitable architectur...	Anuj - SA	8h	25/May	05/Jun	0%
6	Coding	Anuj - SA	6h	01/Jun	26/Jun	0%
7	Deploy	Anuj - SA	-			0%
	SDET:		45h	26/May	30/Jul	0%
9	Build	Vaibhav -SDET	9h	26/May	26/May	0%
10	Code	Vaibhav -SDET	9h	01/Jun	03/Jul	0%
11	Test	Vaibhav -SDET	9h	03/Jul	13/Jul	0%
12	Deploy	Vaibhav -SDET	9h	15/Jul	16/Jul	0%
13	Review user tests	Vaibhav -SDET	9h	30/Jul	30/Jul	0%



14.Organizing People

People working under the project are divided into 3 teams. Each team is lead by one representative.

- **Team A** - Represented by Project Manager (PM) Sabrina
  This team will handle selection of physical devices, Requirement elicitation, Coding, etc
- **Team B** - Represented by Software Analyst (SA) Anuj
  This team will handle forming an architecture and design for the software and is also responsible for coding.
- **Team C** - Represented by Software Developer (SDET) Vaibhav:
  This team will handle debugging, building the complete software, coding, Testing, Reviewing User testing.

These three teams collaborate with each other and develop the software.

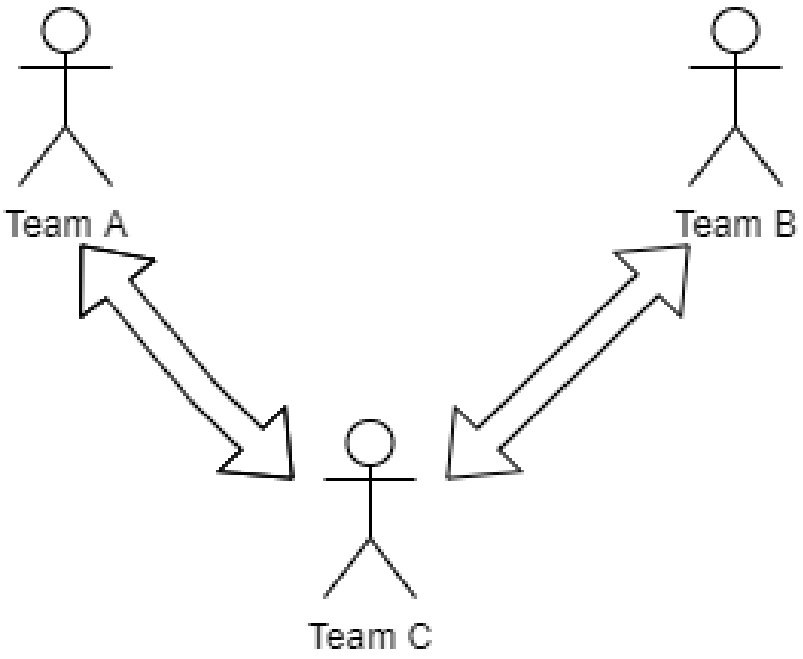
Team A consists of a **requirement engineers, junior developers**, etc who are responsible to select the appropriate hardware systems, install it and make sure it is properly coordinated with the software.

Team B consists of **Software Architects, Junior developers, SDEs** etc who are responsible to code the software and build appropriate architecture for the software.

Team C consists of **SDETs, junior developers, SDEs, QAs** etc who are mainly responsible to develop the software and develop test cases for automated tests and other tests during the development.

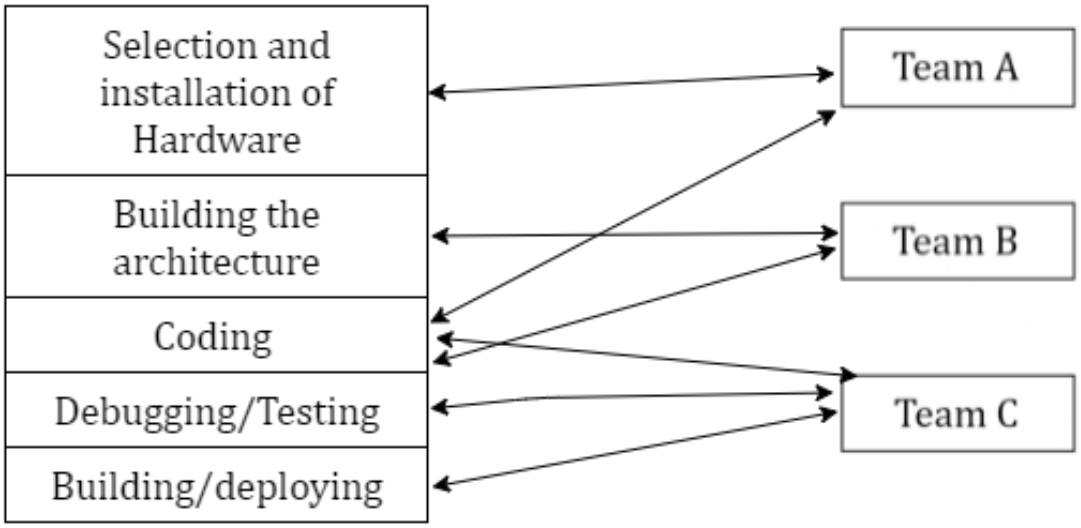
Team Structure:

Democratic team



Functional Organization:

Functional groups Teams



Motivation:

We can classify motivation into two categories:

- Intrinsic motivation
- Extrinsic motivation

Intrinsic motivation:

- By making them feel valued and heard.
- By taking continuous feedback and actually working on those.
- By enhancing work culture experience.
- By appraising the good work and encouraging them to do better.

Extrinsic motivation:

- By giving appraisal.
- Salary raise, based on dedication/efforts.
- Allotting a holiday vacation.
- By rewarding them with goodies.

Stress:

Stress Edward Yourdon quotes a project manager: 'Once a project gets rolling, you should be expecting members to be putting in at least 60 hours a week.

The project manager must expect to put in as many hours as possible.'

Stress can be reduced by good project management
Good project management should lead to:

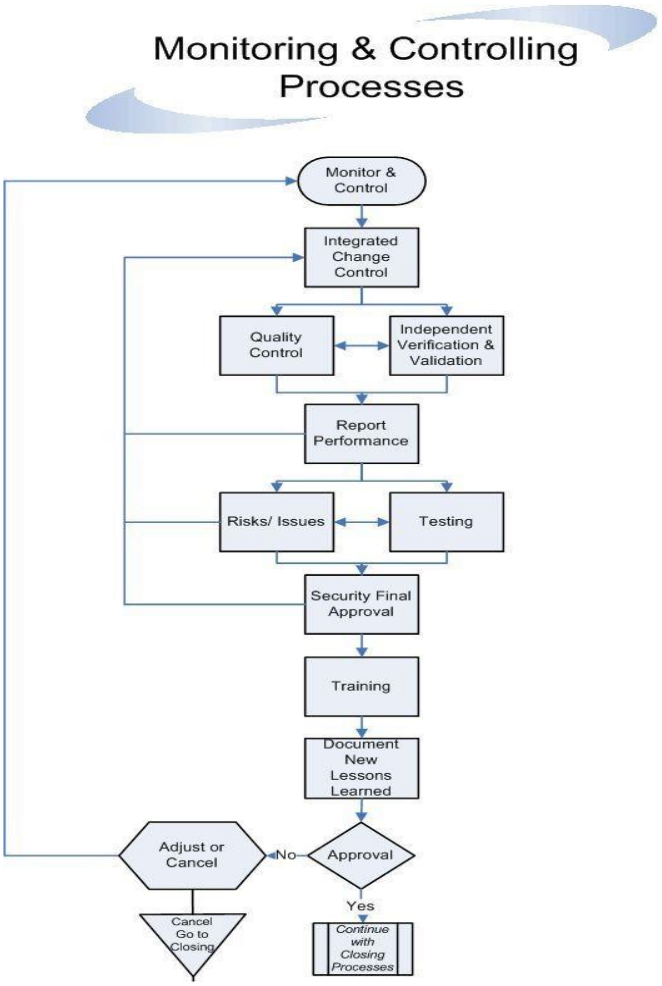
- Reasonable estimates of effort
- Good project control leading fewer unexpected crises
- Making clear what is expected of each team member – reduces role ambiguity
- Reduced role conflict where a person is torn between conflicting responsibilities
- Bullying tactics are a symptom of incompetent project management.

Potential risks associated within team:

Risks Associated	Effect on project
As Team B is responsible for designing architecture and coding, delay caused in design will ultimately cause a delay in development.	Delay in the project can cost us more money and resources.
As Team A is responsible for Testing and Building the project, Delay in the testing can also cause delay in project development.	Poor testing and ultimately result in buggy software.
As there is no superior head of the project there can be lack of responsibility which will ultimately result in sluggish work, uncoordinated work.	Chaos amongst team and unmonitored delay of software building.

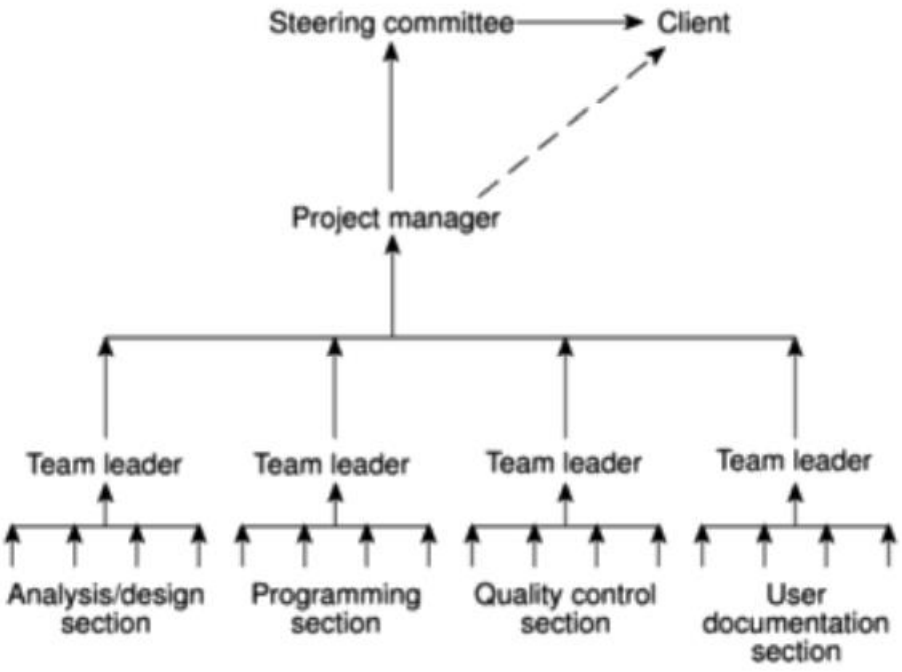
15. Monitoring Contract

Monitoring and Controlling are processes needed to track, review, and regulate the progress and performance of the project.
It also identifies any areas where changes to the project management method are required and initiates the required changes.



Responsibility:

The overall responsibility for ensuring satisfactory progress on a project is often the role of the **Project steering committee** or **Project board.**



Assessing progress:

Progress assessment will normally be made on the basis of information collected and collated at regular intervals or when specific events occur. One way of assessing process is through **Reporting.**

Report type	*Examples*	*Comment*
Oral formal regular	weekly or monthly progress meetings	while reports may be oral formal written minutes should be kept
Oral formal ad hoc	end-of-stage review meetings	while largely oral, likely to receive and generate written reports
Written formal regular	job sheets, progress reports	normally weekly using forms
Written formal ad hoc	exception reports, change reports	
Oral informal ad hoc	canteen discussion, social interaction	often provides early warning; must be backed up by formal reporting

Setting checkpoints:

We plan on setting **monthly checkpoints** to monitor project.

Taking snapshots:

Team leader will assess the progress daily whereas project managers will find weekly or monthly reporting.
Additionally, we plan on monitoring our project using the following ways:

1. Staff meetings - Weekly, Monthly, Annual
2. Partners meeting/Learning Forums (FGD,
3. Surveys)/Retreat
4. Participatory Reviews - Stakeholders
5. Monitoring and Supervision Mission (Self/Donors/Joint)
6. Progress reports/Statistics

16.Conclusion

Through this project, we have recognized and understood the various aspects, procedures and the implementation of a software system that come under **Software project management.**

System For Biometric Authorization Of Voters

PROJECT BY

Sabrina Manickam 19MIS0137

Anuj P Sharma 19MIS0159

Vaibhav Dhiru 19MIS0337

OVERVIEW

1. With this project we aim to solve some of the issues caused by traditional way of authenticating voters, like **identity theft, fake votes** which in turn gives an unfair advantage to a particular party.

2. Proposed project, will access authenticate by **Biometric scanning of the Voter i.e. fingerprint or iris scan**, after the biometric is matched and verified voter is permitted to cast his/her vote, using traditional EVMs and then voters will be marked by indelible ink.

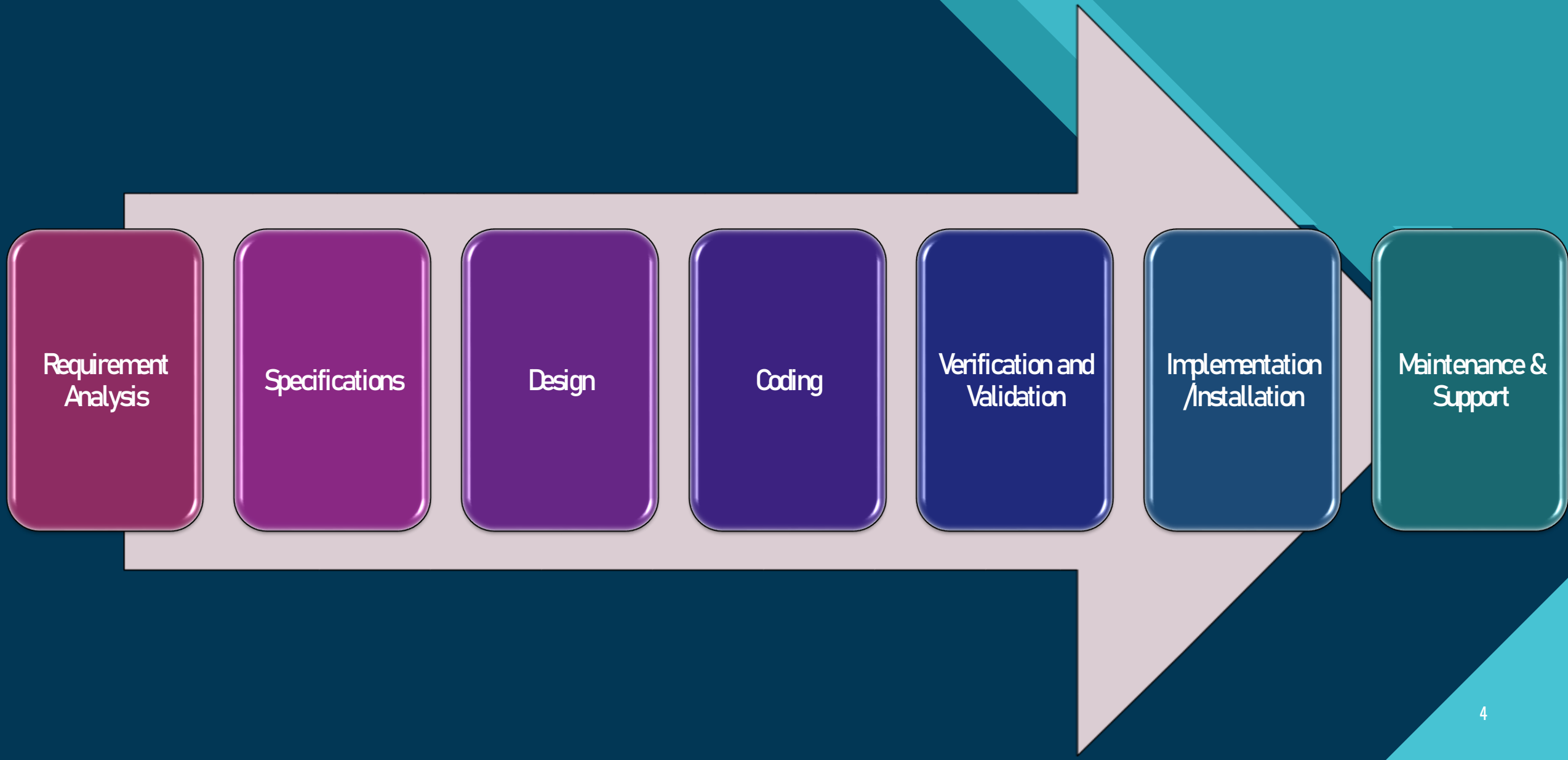
3. Also, we propose the integration of voter number with AADHAR card so that, one centralized database is used to authenticate the voters without the hassle of separate voter ID cards.

4. Upon successful casting of vote, the voter will be marked voted and hence wont be allowed to vote again.

GOALS OF THE SYSTEM

1. The system should be able to eliminate the complex processes involved in the current voting scenario i.e. eradication of voter ID cards, ballot papers etc.
2. Voters should be able to get authorized by their biometric details.
3. The system should not allow any voter not registered in the AADHAR database to vote.
4. The system through its features should be able to overcome the malpractices prevalent in the voting.

PRODUCT LIFE CYCLE



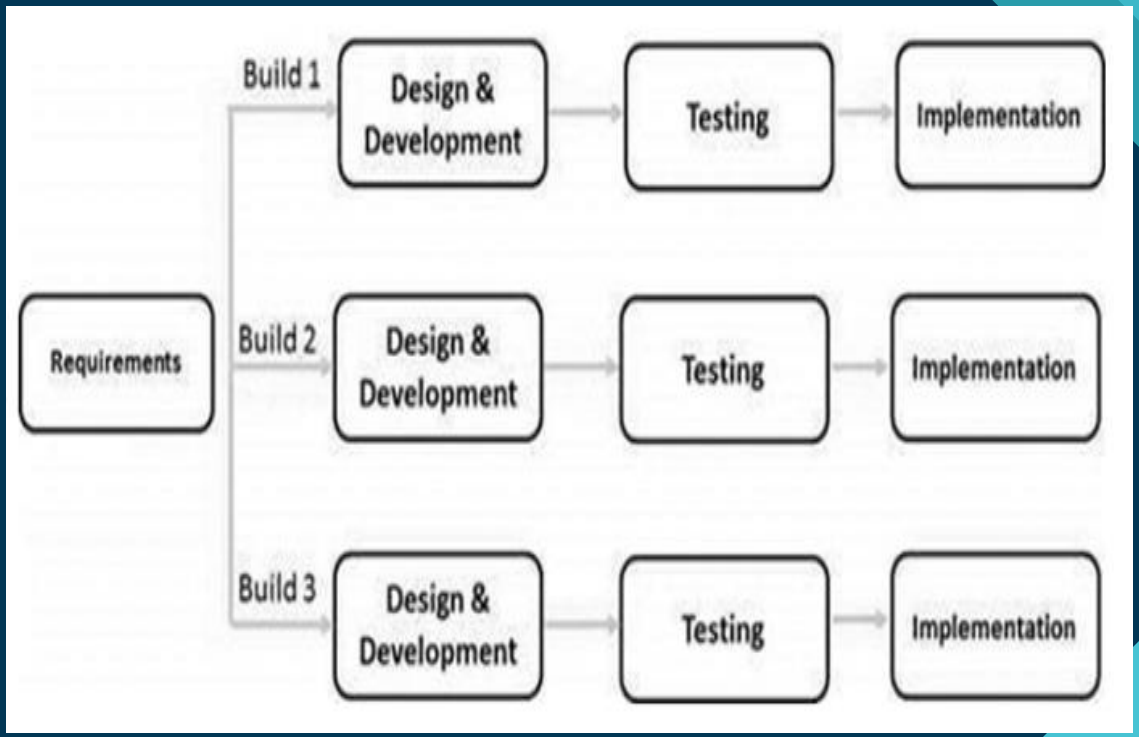
❖ REQUIREMENT ANALYSIS AND SPECIFICATION:

User has come up with following requirements:

- ❖ System that is more secure,
- ❖ System to authenticate the voter quickly.
- ❖ Authenticate from a centralized UIDAIs database.
- ❖ Should support large number of users at a time.
- ❖ Detection and prevention of multiple votes.
- ❖ Simple User Interface and User experience.

❖ DESIGN:

We propose the use of ITERATIVE MODEL.
Iterative process starts with a simple implementation of a subset of the software requirements and iteratively enhances the evolving versions until the full system is implemented. At each iteration, design modifications are made and new functional capabilities are added. The basic idea behind this method is to develop a system through repeated cycles (iterative) and in smaller portions at a time (incremental).



❖ CODING:

New software will be built by scratch using **JAVA PROGRAMMING** language, which will fetch voters information and authenticate with the UIDAI's database.

❖ VERIFICATION AND VALIDATION:

Verification will be done to check whether the product is built according to specifications given, and meets all the quality requirements. It's an internal process, Quality control department checks the product. Done as part of Quality control. (PMBOK – Control Quality process)

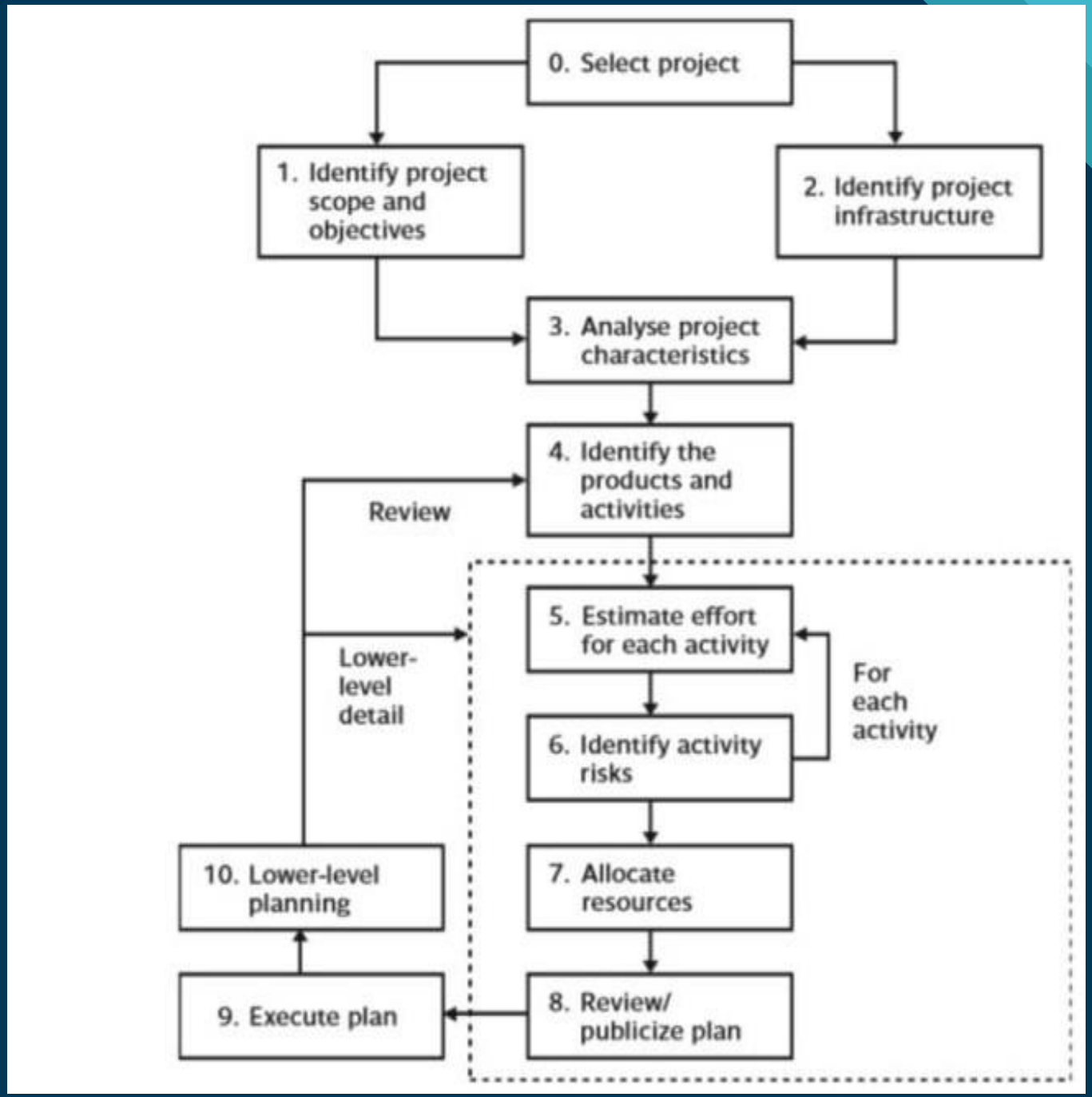
Validation will be done to check whether the product built is acceptable to the customers or not, i.e. checking whether product meets the customer needs or not. It is an external process. Customer checks the product before accepting. Done as part of scope validation. (PMBOK – Validate scope process).

❖ IMPLEMENTATION:

This system will be implemented in phases, dividing India into five parts Central, Southern, Eastern, Western, Northern part. System will be initially installed in some parts of Central India. Based on its reports changes will be implemented and further phases the changes will be implemented.

STAKEHOLDERS

STEPWISE PROJECT PLANNING


0. Select project
1. Identify project scope and objectives
2. Identify project infrastructure
3. Analyse project characteristics
4. Identify the products and activities
Review
5. Estimate effort for each activity
Lower-level detail
For each activity
6. Identify activity risks
7. Allocate resources
8. Review/ publicize plan
9. Execute plan
10. Lower-level planning

Step 0: Select the project:

- The project selected is **System for Biometric authorization of voters,** this is a system that would eradicate the use of voter ID to simplify the voting process by integrating Voter number with Aadhar card so that one can use his/her biometric to authenticate and cast vote.

Step 1: Identify the project scope and objectives:

- The objective of project is to minimize the use of voter ID, Integrate the voter number into AADHAR for quick and secure authentication.
- Its main aim is to eradicate identity theft that leads to fake votes.
- Stakeholders Identified:
  - Government of India
  - Election Commission
  - UIDAI
  - Citizens
  - Biometric Machine enabler
  - Requirements Engineer
  - Software Architect
  - Project Manger.

Step 2: Identify project infrastructure

- Technology infrastructure consists of hardware systems, software, network connections, and servers.
  - UIDAI server would be used to authenticate users.
  - We would also need a server to check whether the person has casted vote.
  - Decent internet connection would be needed.
  - In terms of hardware, at least 4GB RAM and 128GB internal storage with continuous power supply would be needed.

Step 3: Analyze project characteristics

- The general purpose of this part of planning operation is to ensure that the appropriate methods are used for the project.
  - Authenticate user, using biometric scanner.
  - Check voter’s details with UIDAI’s server.
  - After verification, allow voter to cast vote.
  - Voter can not cast vote if already voted.

Step 4: Identify project products and activities

- The general purpose of this part of planning operation is to ensure that the appropriate methods are used for the project.
  - Authenticate user, using biometric scanner.
  - Check voter's details with UIDAI's server.
  - After verification, allow voter to cast vote.
  - Voter can not cast vote if already voted.

Step 5: Estimate effort for each activity

- There are many modules we would work on, some of which has higher priority based on requirement elicitation.
  - Verification of Voters biometric details **: Highest Priority**.
  - Permit voter to cast vote: **High Priority**.
  - After one casts vote, Mark him/her voted: **High Priority.**
  - Don’t allow voter to cast vote more than one: **High priority.**
  - UI and UX : **Low Priority**

Step 6: Identify activity risks

- Failure to authenticate users information from UIDAI's server, due to network and server issues.
  - Permit voters to vote repeatedly.
- Doesn't allow voters to cast vote.

Step 7: Allocate Resources

- Each task requires resources in order to be successfully performed. As a minimum, most tasks require a human resource to carry out some actions. Usually, the person starts with some input materials which are used to produce an output.
  - Access to UIDAI's server to authenticate voter's details.
  - A database to store the details of voters, who have casted vote.
  - Biometric scanner, to scan the biometrics of the voter.

Step 8: Review and Publicize Plan

- All module design documentation has to be reviewed by the group of developers assigned by Election Commission of India, before coding of that module starts taking place. To ensure all requirements are met.

Step 9: Execute plan & Step 10: Lower-level Planning

- Project plan is made and implemented, required domains people are assigned task by project manager.
- Modules that are independent are given more priority in
- terms of testing

STRATEGIC ASSESSMENT

Strategic planning is defined as an organization's process of defining its strategy, or direction and making decisions on allocating its resources to pursue this strategy, including its capital and people.

It deals with :

- **What do we do?**
- **For whom do we do it?**
- **How do we excel?**

Issue – 1	Objectives	Will our project meets the goal of removing electoral malpractices?
Issue – 2	Is Plan	Can the existing AADHAR Identification system will be used feasibly?
Issue – 3	Organization Structure	Will the proposed Voting system will ease the process of Voting in India?
Issue – 4	MIS	Will the Voting system will provide biometric identification of voter?
Issue – 5	Personnel	Will the system will help in reducing the use of human resource and will provide a more automated system of voting?
Issue – 6	Image	Will it maintain the integrity of the voting procedures. The system will instill faith in voting among voters?

TECHNICAL ASSESSMENT

Technical assessment of a proposed system evaluates functionality against available:

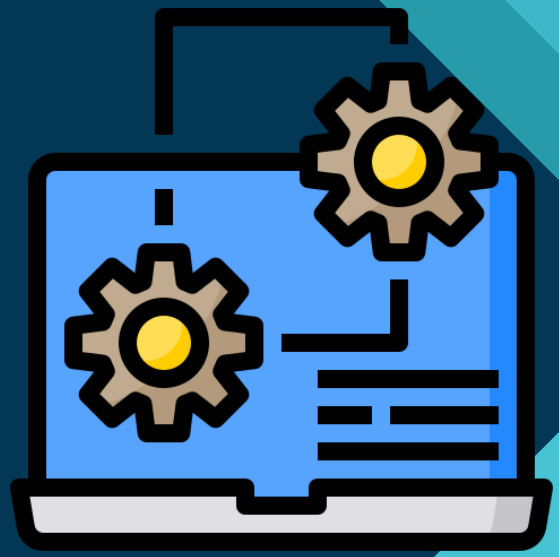
- Hardware
- Software

Hardware assessment:

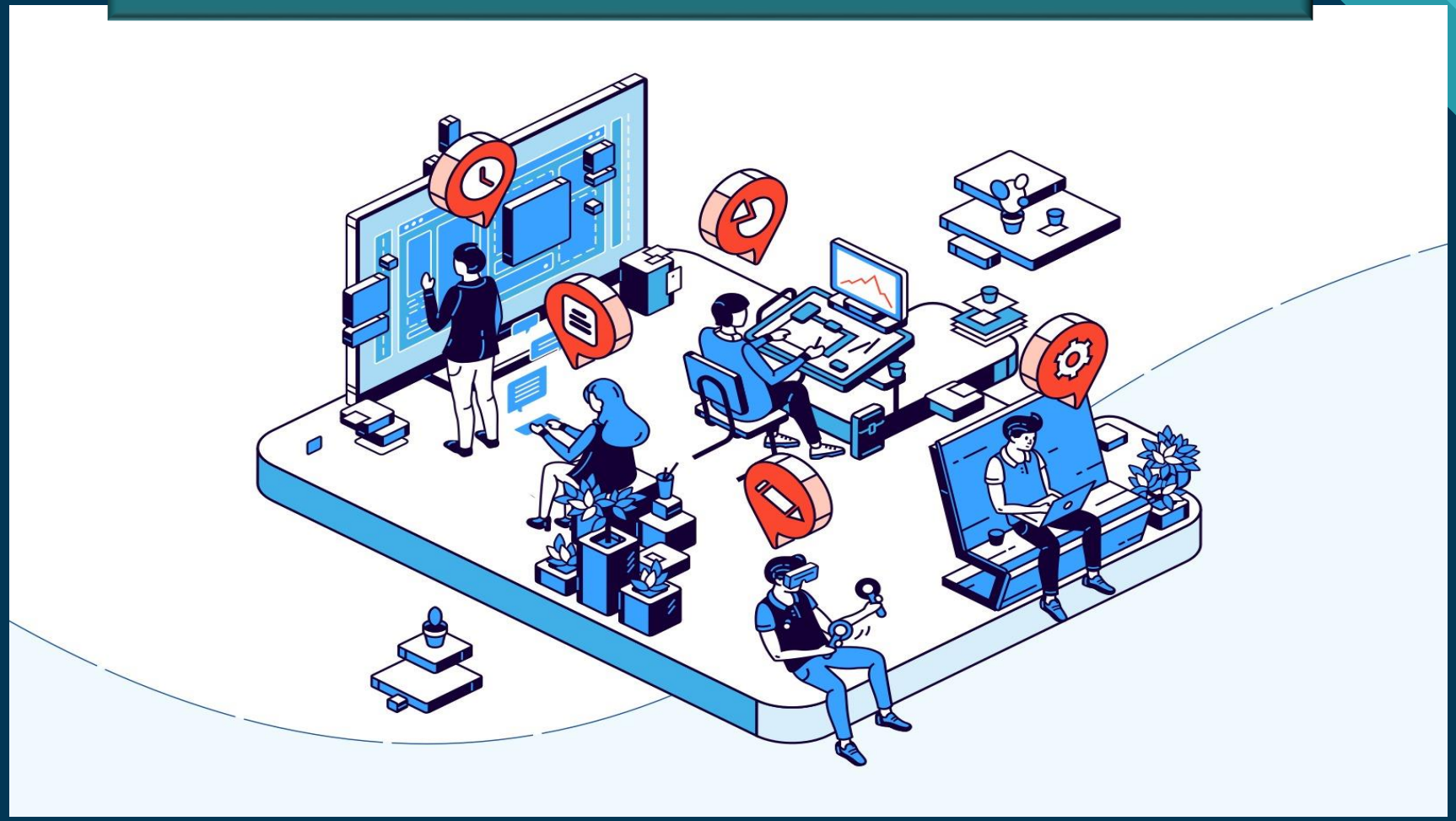
1. This project will require the use of biometric fingerprint and retina scanning devices.
2. The use of the monitor to display voter's details at the election booth, is also required.

Software assessment:

1. The voter information is limited to the type of data supported by the existing AADHAR Database.
2. The system will be supported on all Windows based platforms.
3. The project will be programmed using Python language.



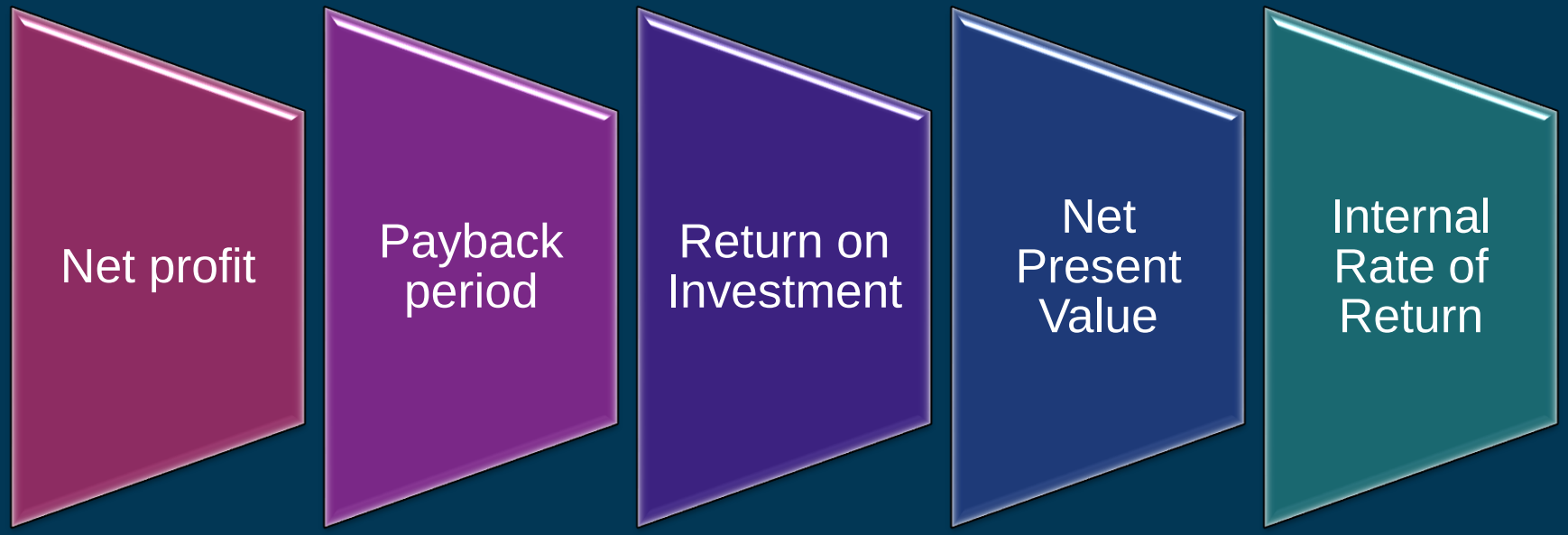
COST BENEFIT ANALYSIS



COST BENEFIT ANALYSIS

The most common way of carrying out an assessment of a proposed information system, or other development, is by comparing the expected costs of development and operation of the system with the benefits of having it in place.

Cost Benefit Evaluation techniques:



NET PROFIT

Calculated by subtracting a company's total expenses from total income.

NET PROFIT=TOTAL COSTS-TOTAL INCOME

The table below shows the estimated investment and return for the first 6 years of the project after its investment:

YEAR	PROJECT COSTS
0	-1,00,00,000
1	10,00,000
2	10,00,000
3	20,00,000
4	20,00,000
5	40,00,000
6	20,00,000

NET PROFIT= -1,00,00,000+10,00,000+10,00,000+20,00,000+20,00,000+40,00,000+20,00,000
=20,00,000

PAYBACK PERIOD

The payback period is the time taken to recover the initial investment.

YEAR	PROJECT COSTS	PAYBACK
0	-1,00,00,000	-1,00,00,000
1	10,00,000	-90,00,000
2	10,00,000	-80,00,000
3	20,00,000	-60,00,000
4	20,00,000	-40,00,000
5	40,00,000	0000000
6	20,00,000	20,00,000

It takes 5 years to recover from the initial investment. Therefore, payback period is 5 years.

RETURN ON INVESTMENT

It provides a way of comparing the net profitability to the investment required.

Average annual profit= 20,00,000/6

ROI=((20,00,00/6)/1,00,00,000)*100=3.33%

IRR (Internal Rate Return)

The IRR compares returns to costs by asking: "What is the discount rate that would give the cash flow stream a net present value of 0?"

YEARS	0	1	2	3	4	5	6
CASE A							
NET CASH FLOWS	-10000000	10,00,000	10,00,000	20,00,000	20,00,000	40,00,000	20,00,000
IRR	5%						

RISK EVALUATION

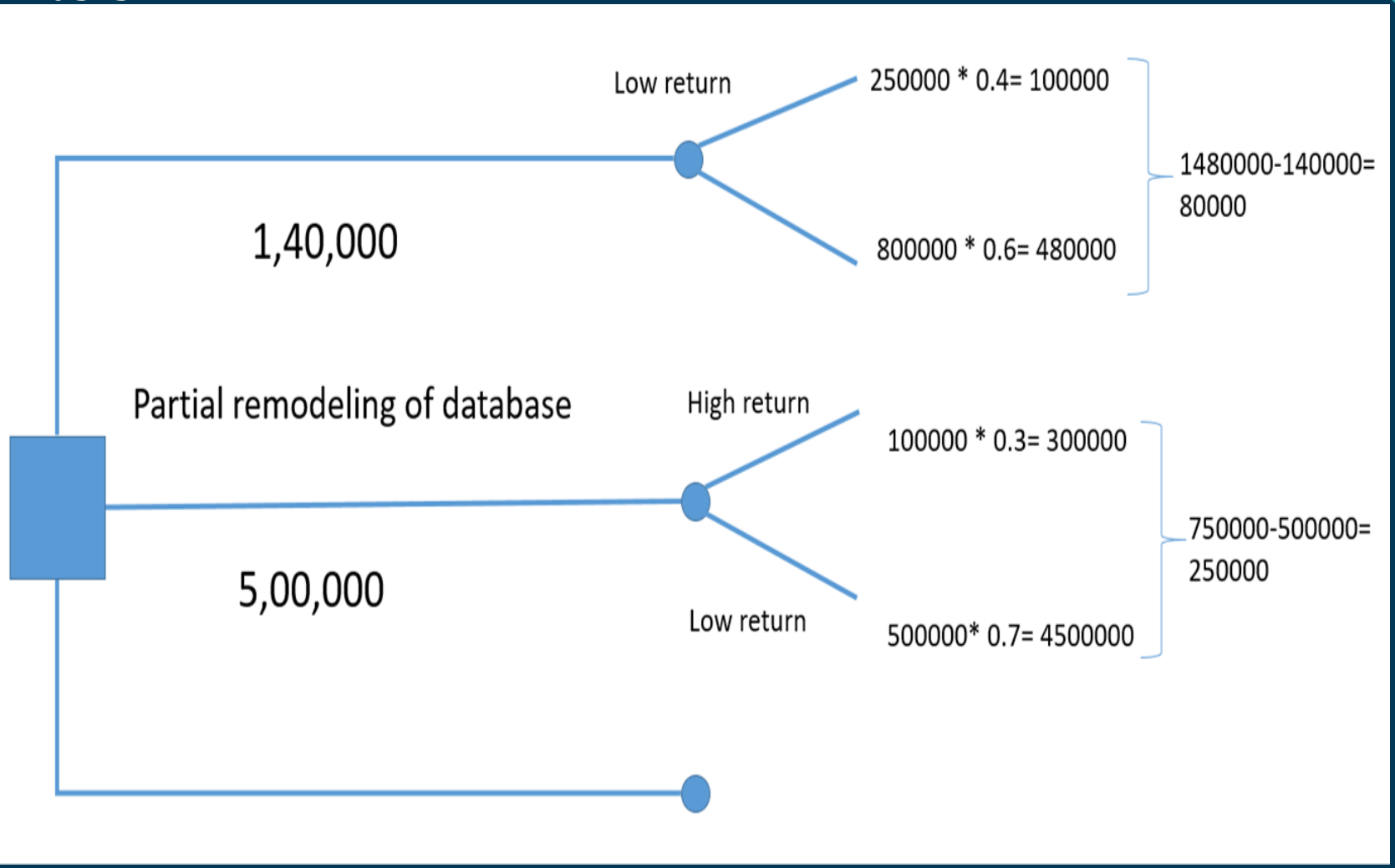
Every project involves risk of some form. When assessing and planning a project, we are concerned with the risk of the project's not meeting its objectives.

Risk assessment matrix:

RISK	IMPORTANCE	LIKELIHOOD
• Software never completed or delivered	High	Low
• Project cancelled after design stage	High	Low
• Software delivered late	Medium	Medium
• Development budget exceeded <=20%	Low	Medium
• Development budget exceeded <=20%	Medium	Low
• Maintenance costs higher than estimated	Low	Low

Our project uses the AADHAR UIDIA Database to access the biometric information of Voters.

As project managers we can either propose **complete remodeling of the database** or **partial remodeling of the database** or **to stay as is.**



Partial remodeling of database is more beneficial.

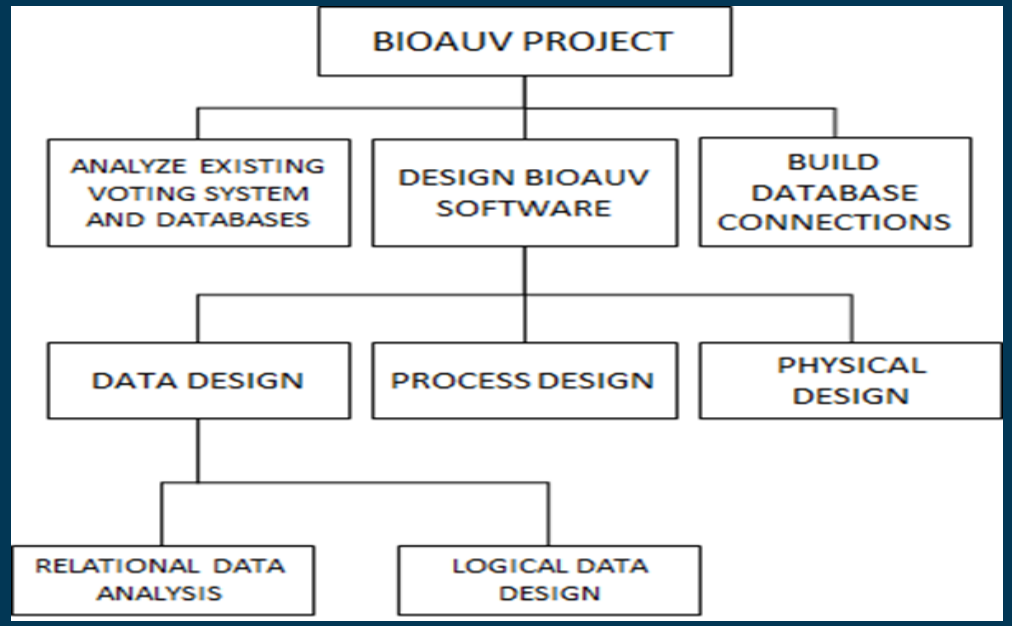
PROJECT SCHEDULING

A project schedule is a detailed project plan showing dates when each acitvity should start and finish and when and how much each resource will be required. It consists of four main stages:

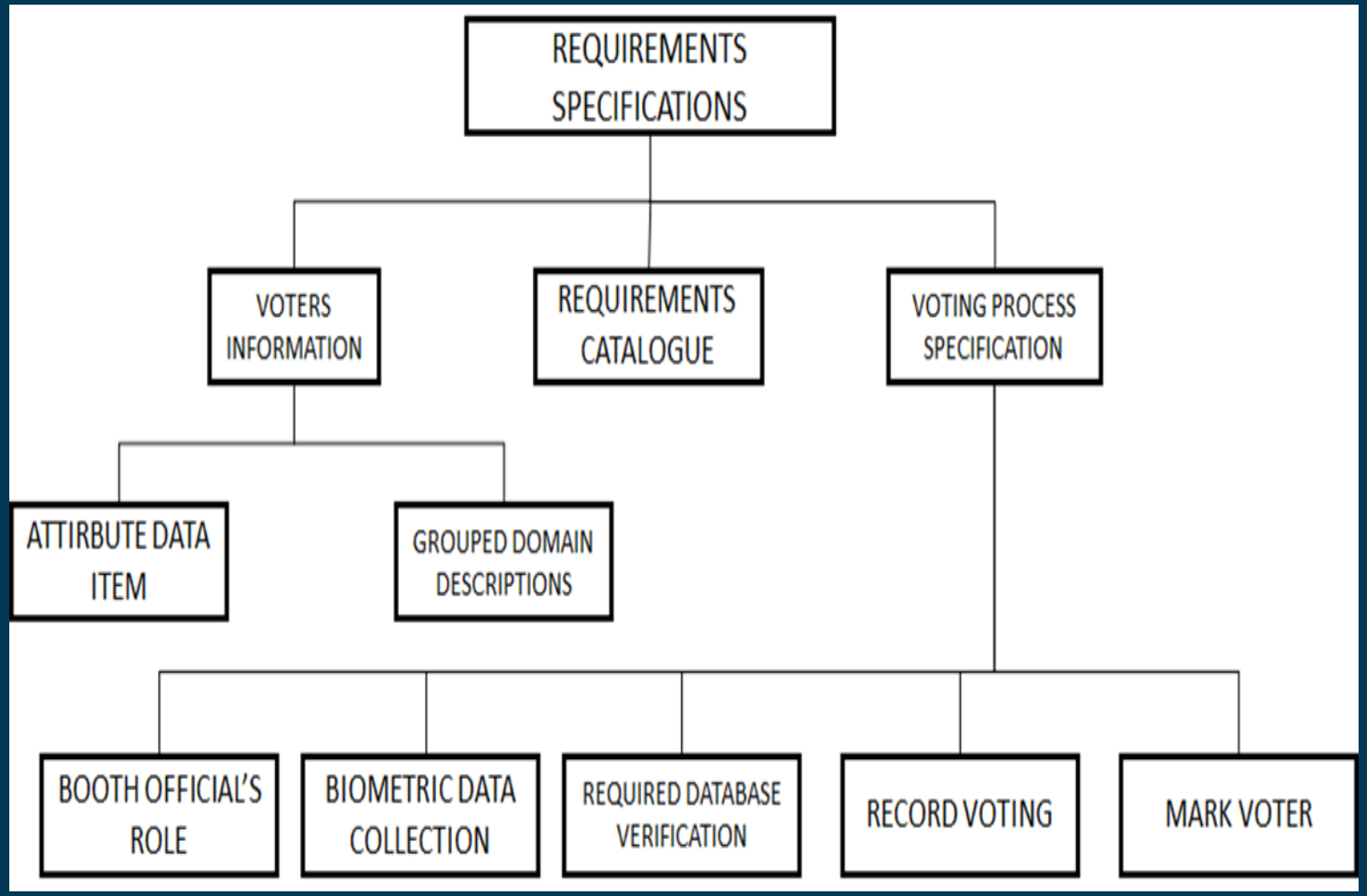
- Constructing an activity plan
- Risk analysis
- Resource allocation
- Schedule production

Work Breakdown Structure

Involves identifying the main tasks required to complete a project and then breaking each of these down into a set of lower- level tasks.



PRODUCT BASED APPROACH



ACTIVITY MANAGEMENT

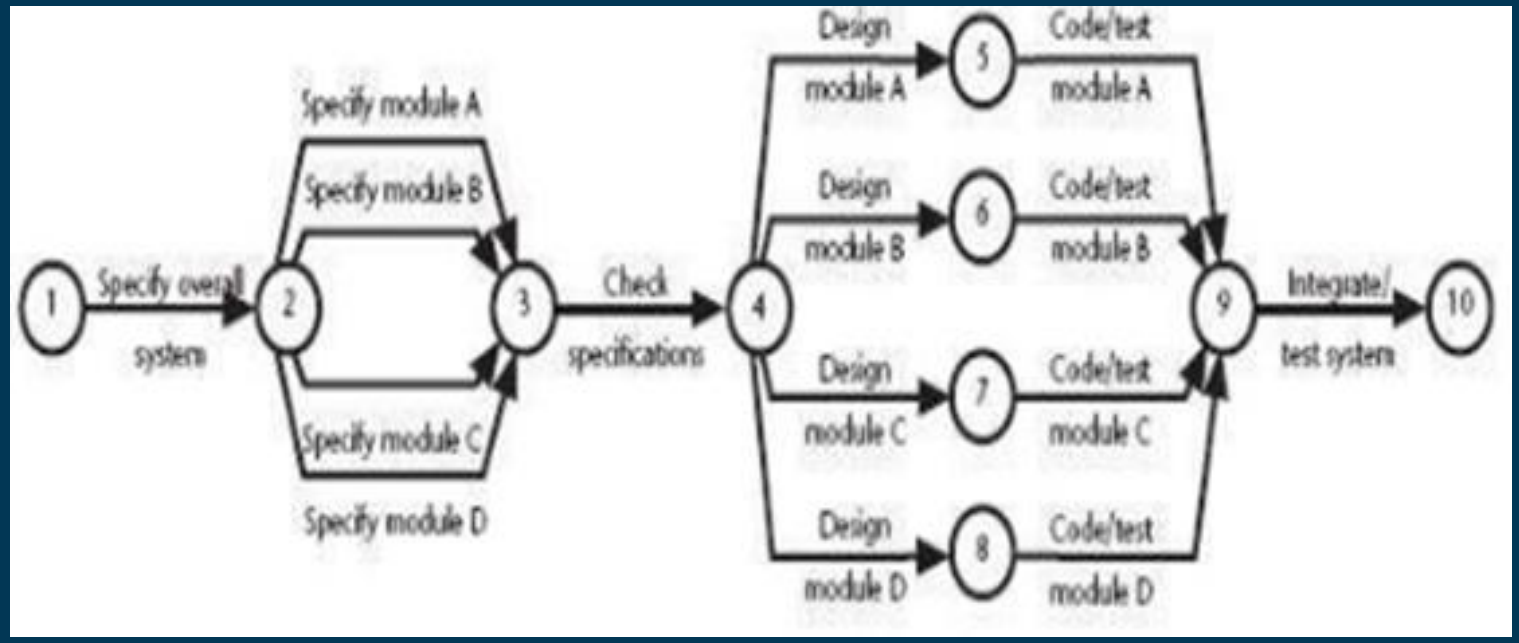
Defining project and activities

- A project is composed of a number of interrelated activities.
- A project may start when at least one of its activities is ready to start.
- A project will be composed when all of the activities it encompasses have been completed
- An activity must have a cleared defined start and a a clearly defined end-point
- If an activity requires a resource then that resource requirement must be forecastable
- The duration of an activity must be forecastable
- Some activities might require that others are completed before they can begin

Activity-On-Arrow

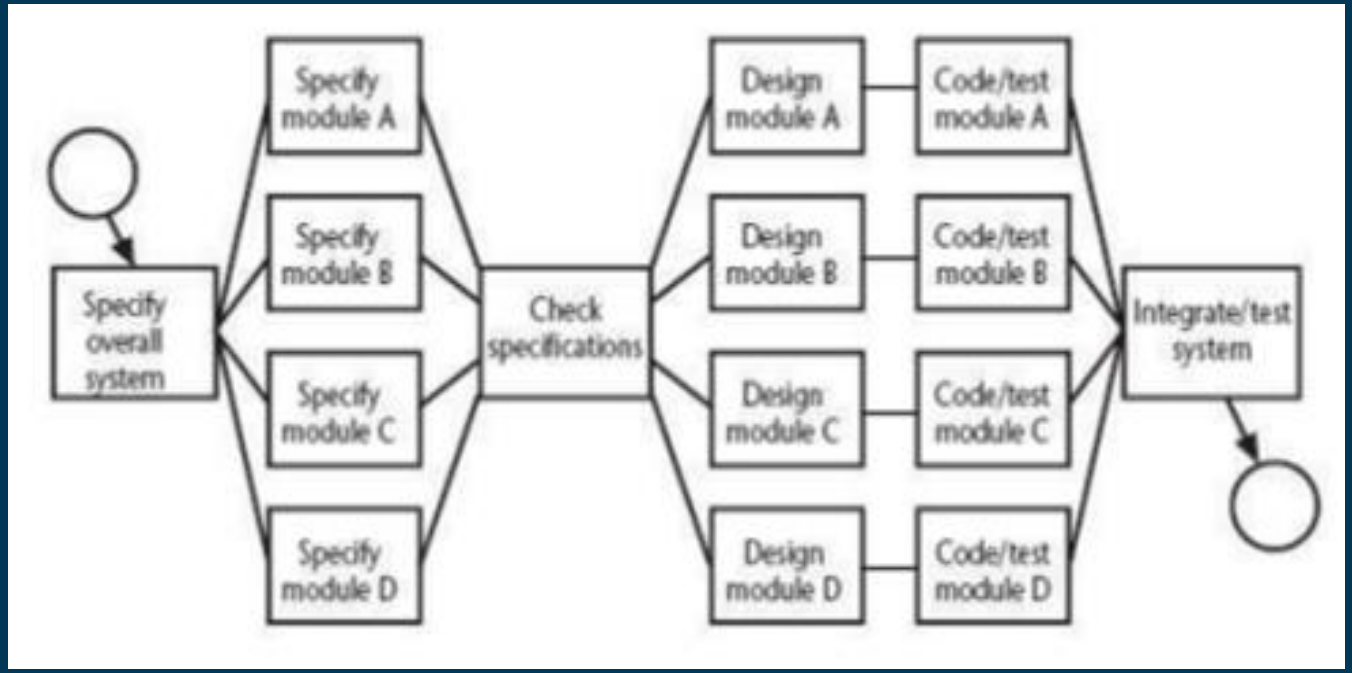
Used by CPM(Critical Path Method) and PERT (Program Evaluation Review Technique) to visualize the project as a network.

- Activities are drawn as arrow joining circles , or nodes, which represent the possible start and/or completion of an activity or set of activities



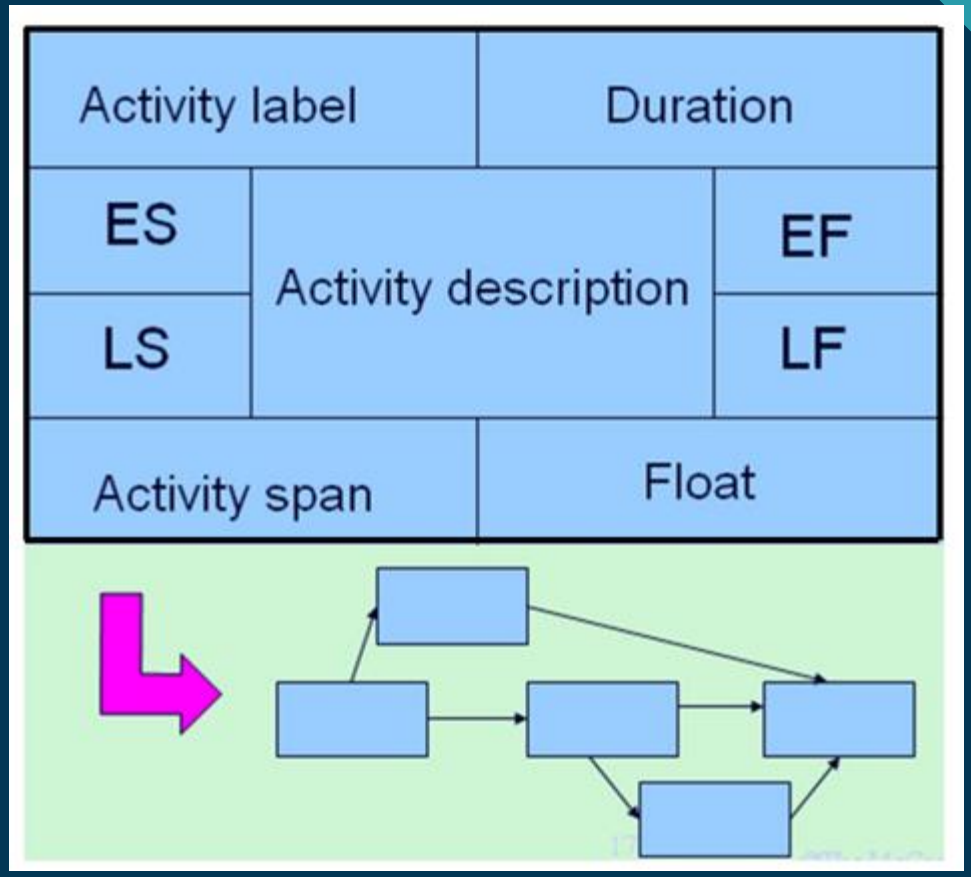
Activity-On-Node

- User by precedence networks
  - Has become popular
  - Widely adopted
- Activities are represented as nodes
- The links between nodes represent precedence (or sequencing) requirement.



Constructing Precedence network for Biometric System for Voters System

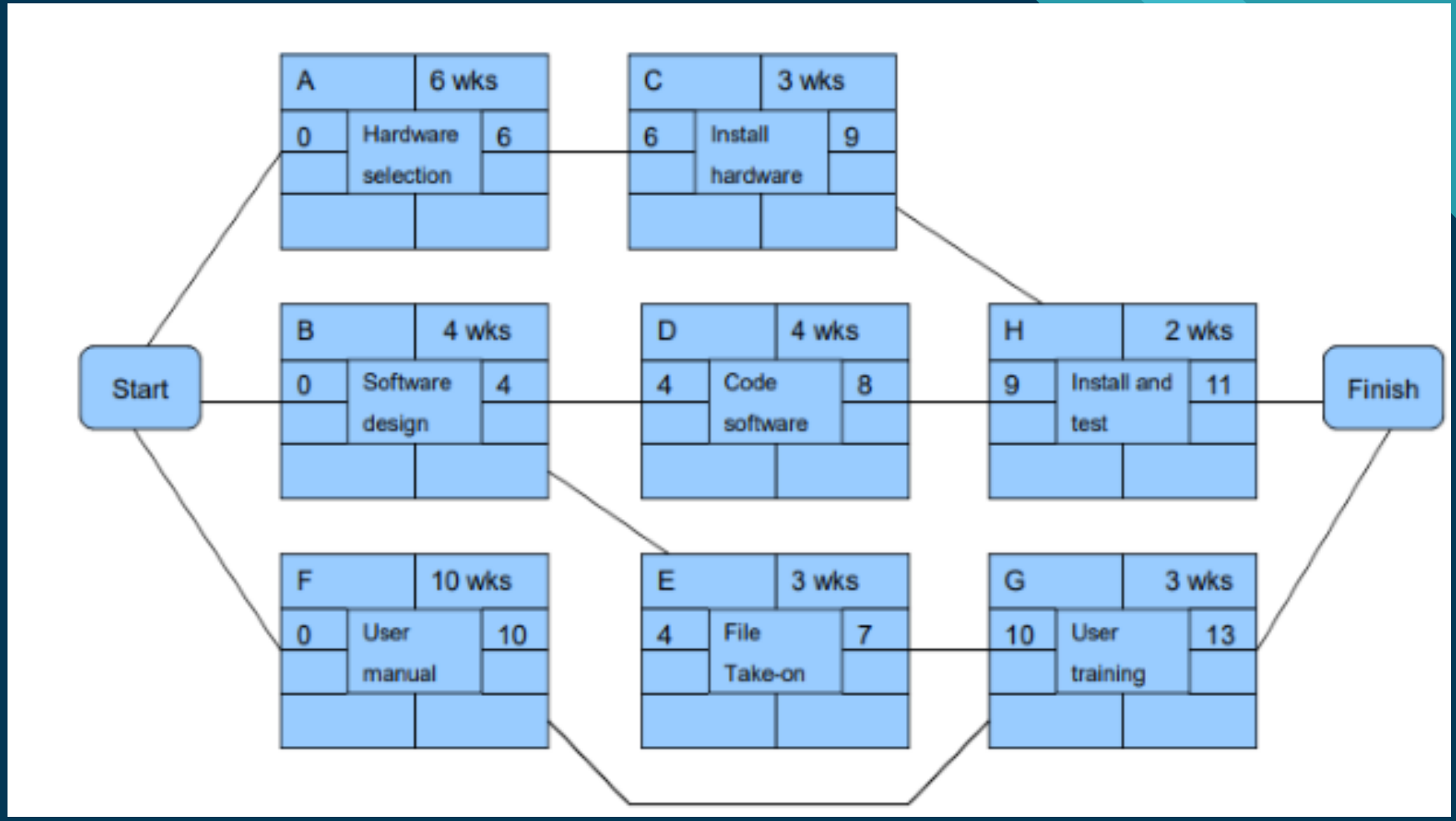
- **Notation**



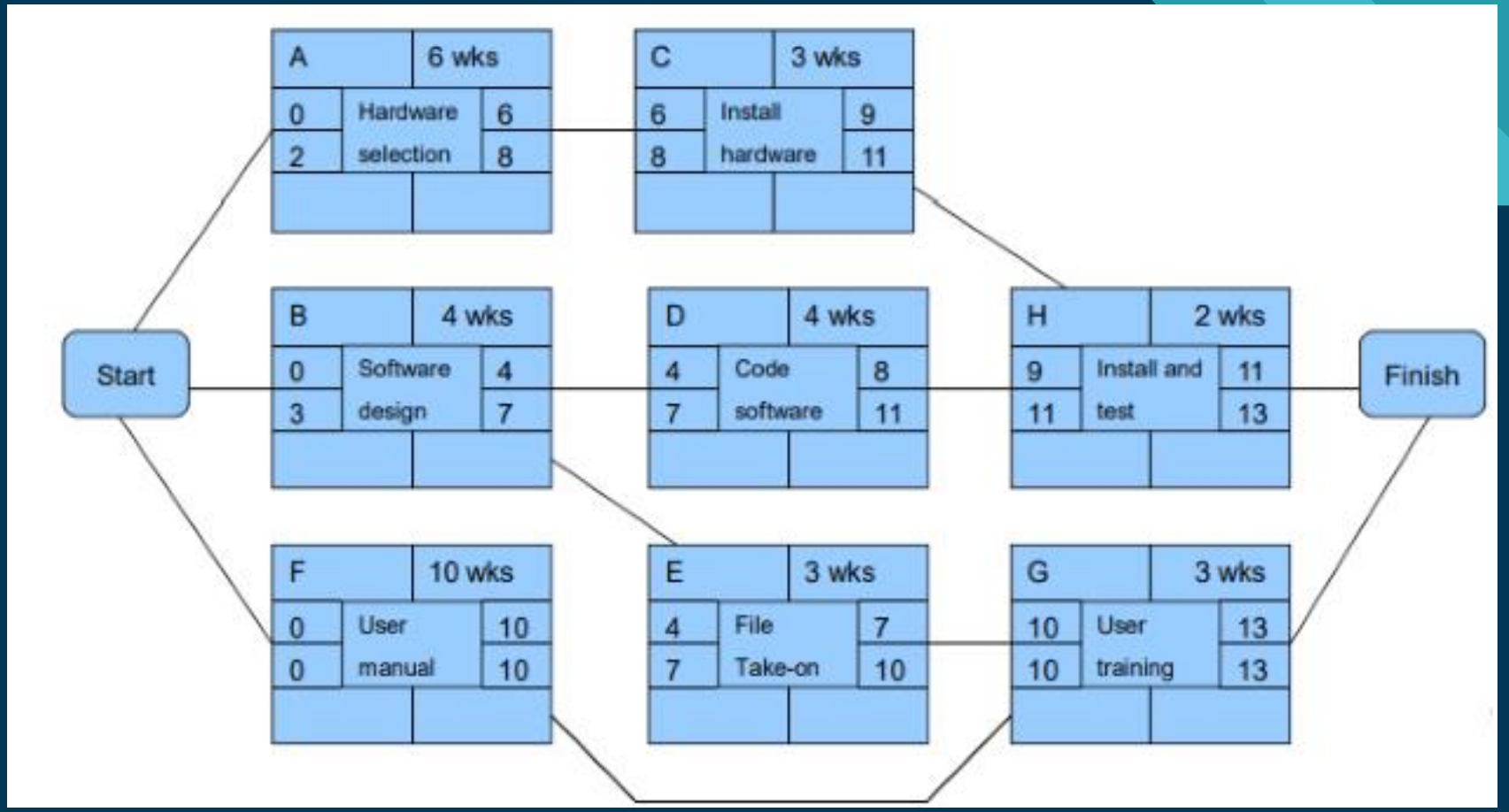
Project specification with estimated activity durations and precedence requirements

ACITIVITY	DURATION(WEEKS)	PRECEDENCE
A Hardware selection	6	
B Software design	4	A
C Biometric devices installation	3	B
D Code and test software	4	B
E Distribute software	3	
F Write user manuals	10	E,F
G Train booth officials	3	C,D
H Install and test system	2	

Forward Pass

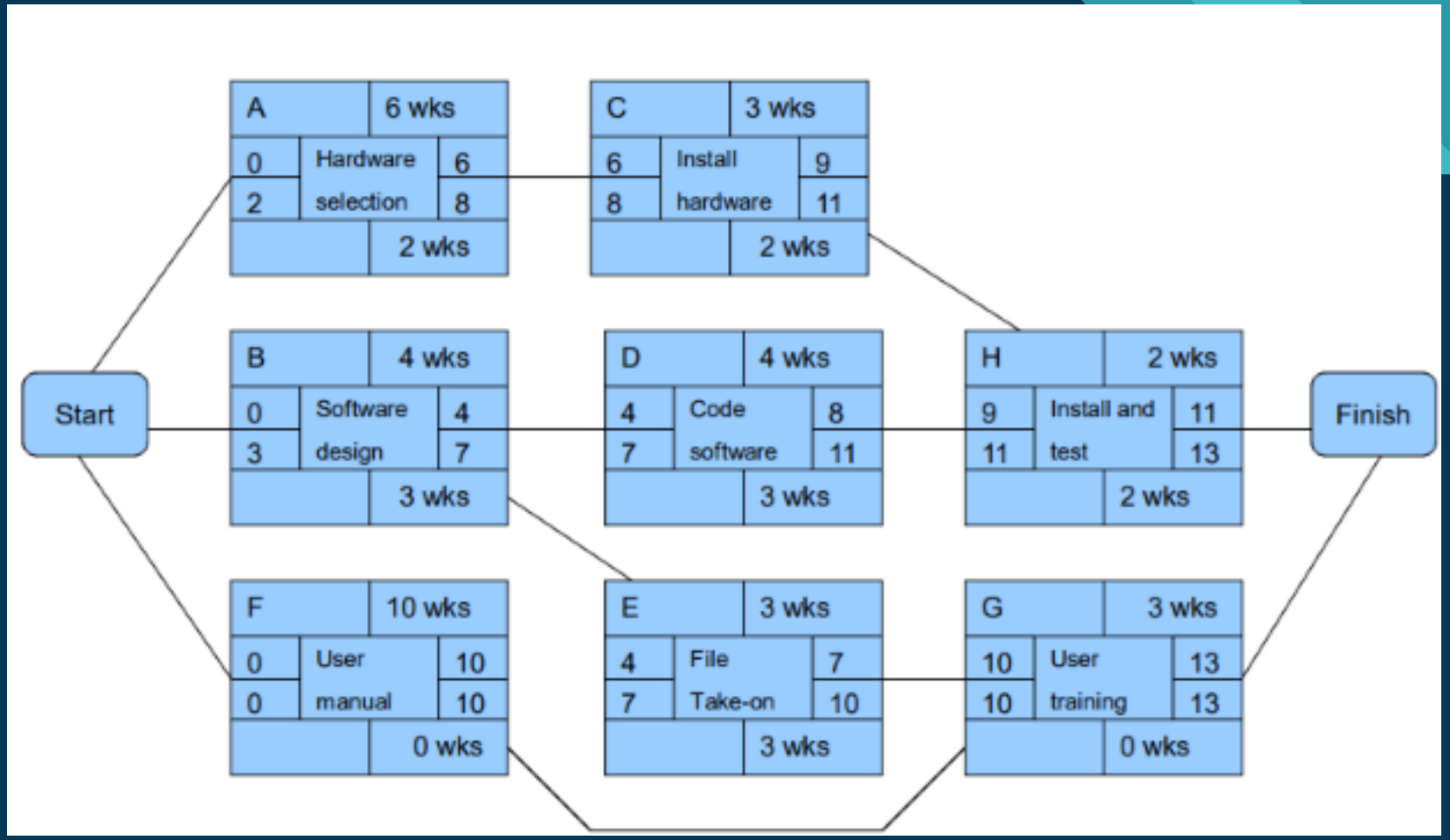


Backward Pass



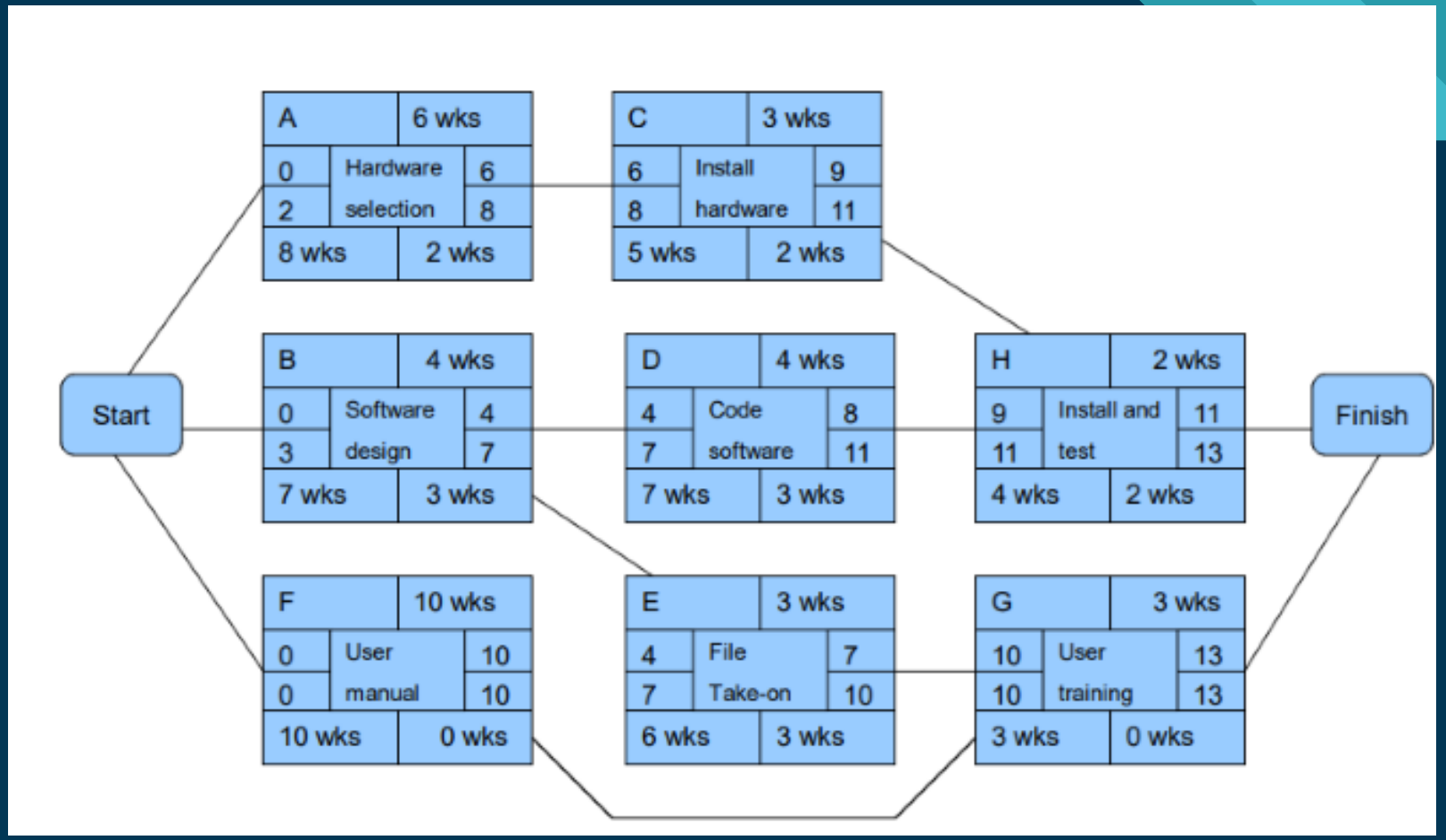
Float

Float=ES-LS



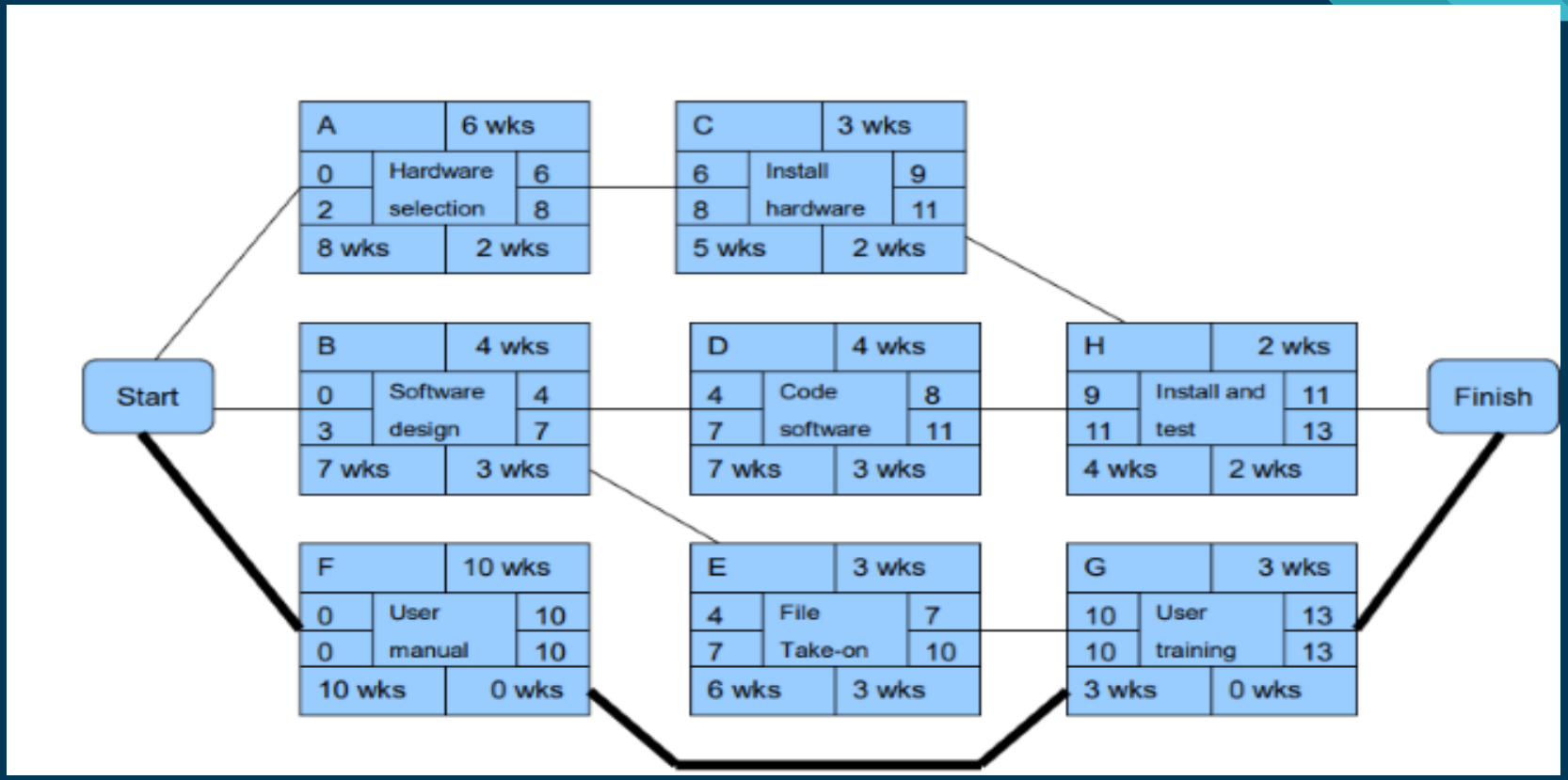
Activity span

Activity span=LF-ES



Critical path:

- The path which defines the duration of the project.
- Note the path through network with zero floats
- Critical path: any delay in an activity on this path will delay whole project



Advantages of CPM

1.Helpful for scheduling, monitoring, and controlling projects. The activities and their outcomes can be shown as a network

2.CMP determines the project duration, which minimized the sum of direct and indirect costs

3. Evaluates which activities can run parallel to each other.

4. Displays dependencies to help scheduling

Disadvantages of CPM

1.CPM's can be complicated, and complexity increases for larger projects

2.Does not handle the scheduling of personnel or the allocation of resources

3.The critical path is not always clear and needs to be calculated carefully

4.Estimating activity completion times can be difficult

RISK MANAGEMENT

What is a Risk?

A Risk is an uncertain event or condition that occurs in a project which has a positive or negative effect on the overall project objectives.

Risk Categorization

- **Project risks**
- **Technical risks**
- **Business risks**

APPROACH:

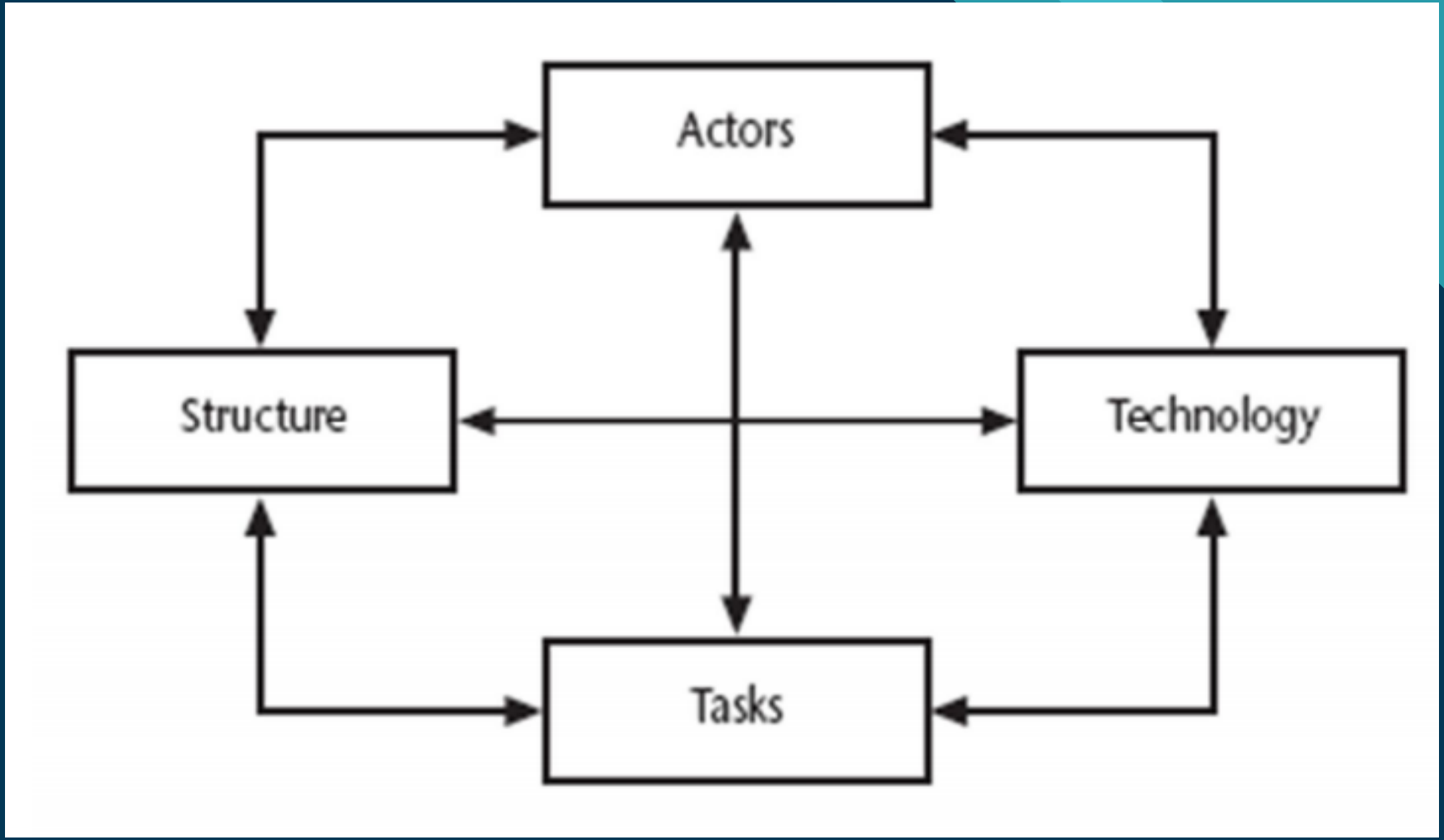
- Known risks
- Predictable risks
- Unpredictable risks

Proactive risk strategies

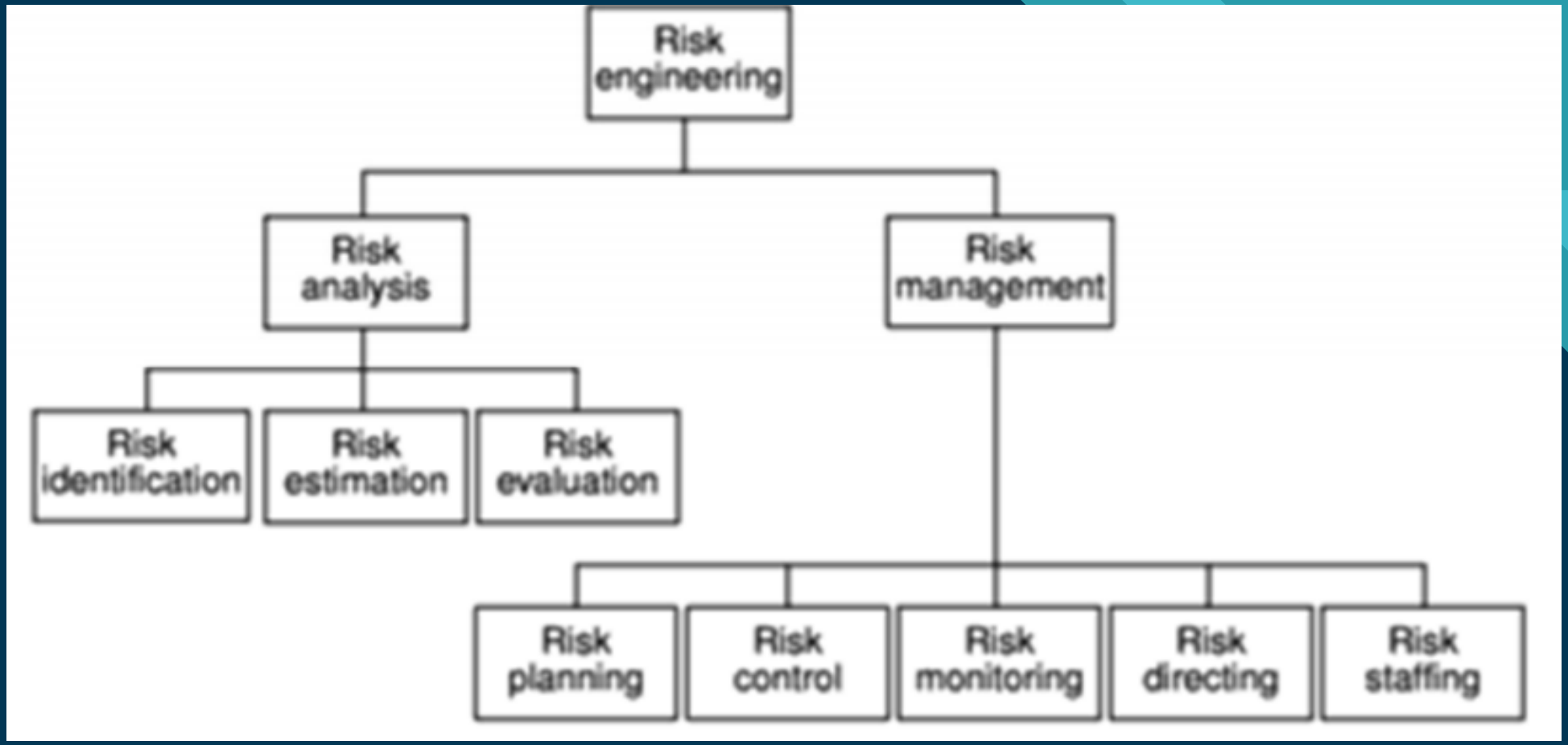
Steps for risk management are followed:

1. Identify the Risk
2. Analyze the Risk
3. Rank/Prioritize the Risk
4. Develop a plan

Sociotechnical Model of Risk Categorization



Barry Boehm's Risk Engineering



A framework for dealing with risk

The planning for risk includes these steps:

- Risk identification – what risks might there be?
- Risk analysis and prioritization – which are the most serious risks?
- Risk planning – what are we going to do about them?
- Risk monitoring – what is the current state of the risk?

Factors To Consider In Risk Identification

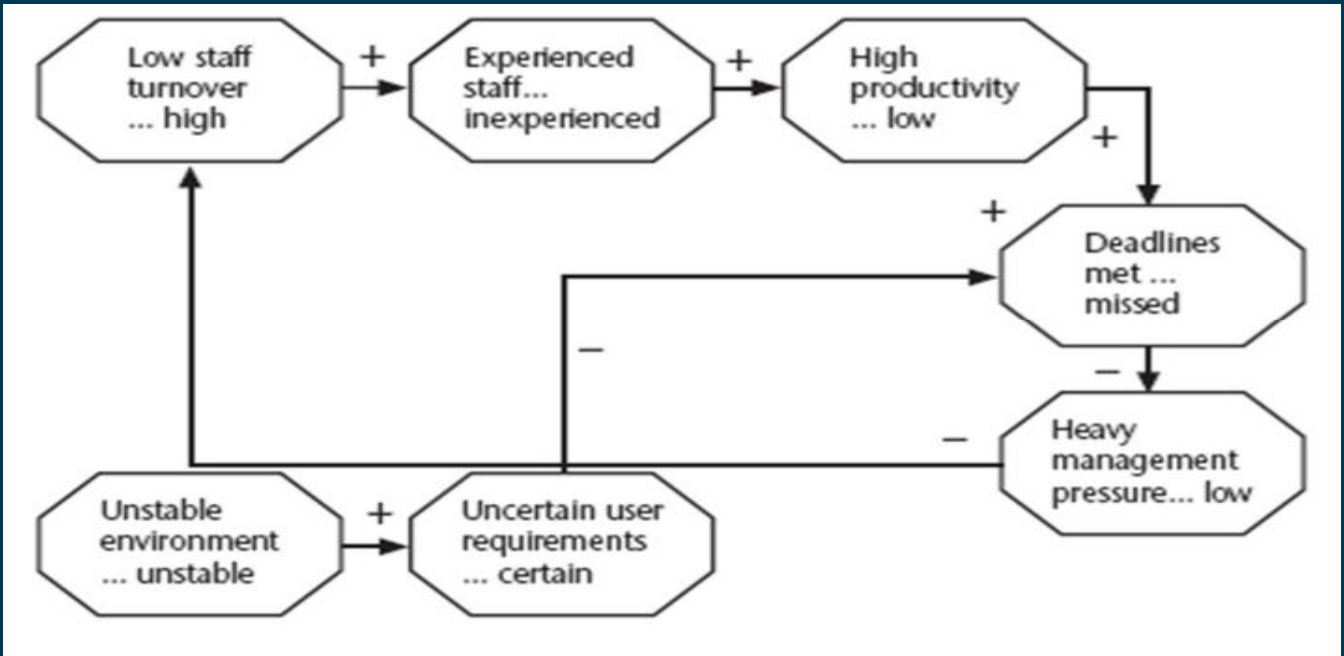
- Application factors
- Staff Factors
- Project Factors
- Project method
- Change factors
- Supplies factors
- Environmental factors
- Health and safety factors

Risk identification

Approaches to identifying risks include:

- Use of checklists – usually based on the experience of past projects
- Brainstorming – getting knowledgeable stakeholders together to pool concerns
- Causal mapping – identifying possible chains of cause and effect

Causal mapping



Reducing the risks

- Hazard prevention
- Likelihood reduction
- Risk avoidance
- Risk transfer
- Contingency planning

Boehm's top 10 development risks

Risk	Risk reduction techniques
Personnel shortfalls	Staffing with top talent; job matching; teambuilding; training and career development; early scheduling of key personnel
Unrealistic time and cost estimates	Multiple estimation techniques; design to cost; incremental development; recording and analysis of past projects; standardization of methods
Developing the wrong software functions	Improved software evaluation; formal specification methods; user surveys; prototyping; early user manuals
Developing the wrong user interface	Prototyping; task analysis; user involvement

Gold plating	Requirements scrubbing, prototyping, design to cost
Late changes to requirements	Change control, incremental development
Shortfalls in externally supplied components	Benchmarking, inspections, formal specifications, contractual agreements, quality controls
Shortfalls in externally performed tasks	Quality assurance procedures, competitive design etc
Real time performance problems	Simulation, prototyping, tuning

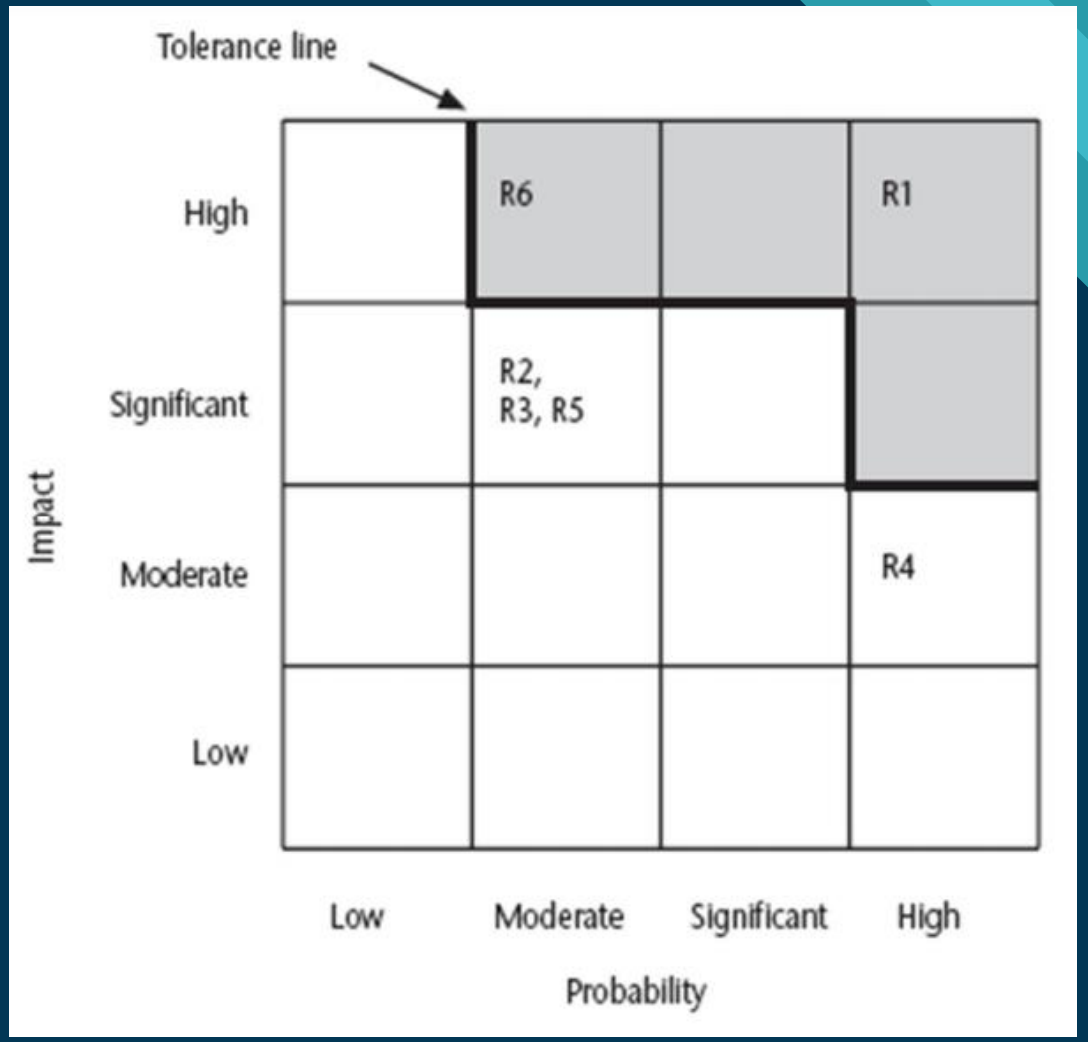
Risk prioritization

Risk exposure (RE)= (potential damage) x (probability of occurrence)

Risk exposure assessment for our system

	Hazard	Likelihood	Impact	Risk exposure
R1	Technical glitches	9	9	81
R2	Database Failure	4	5	20
R3	Detection problem	5	6	30
R4	People with burns ,cuts and wounds on fingers	9	3	27
R5	Hardware issues	3	6	18
R6	Sensor not working	4	8	32

Probability impact matrix



Risk probability: qualitative descriptors

Probability level	Range
High	Greater than 50% chance of happening
Significant	30-50% chance of happening
Moderate	10-29% chance of happening
Low	Less than 10% chance of happening

Qualitative descriptors of impact on cost and associated range values

Impact level	Range
High	Greater than 30% above budgeted expenditure
Significant	20 to 29% above budgeted expenditure
Moderate	10 to 19% above budgeted expenditure
Low	Within 10% of budgeted expenditure.

RESOURCE ALLOCATION

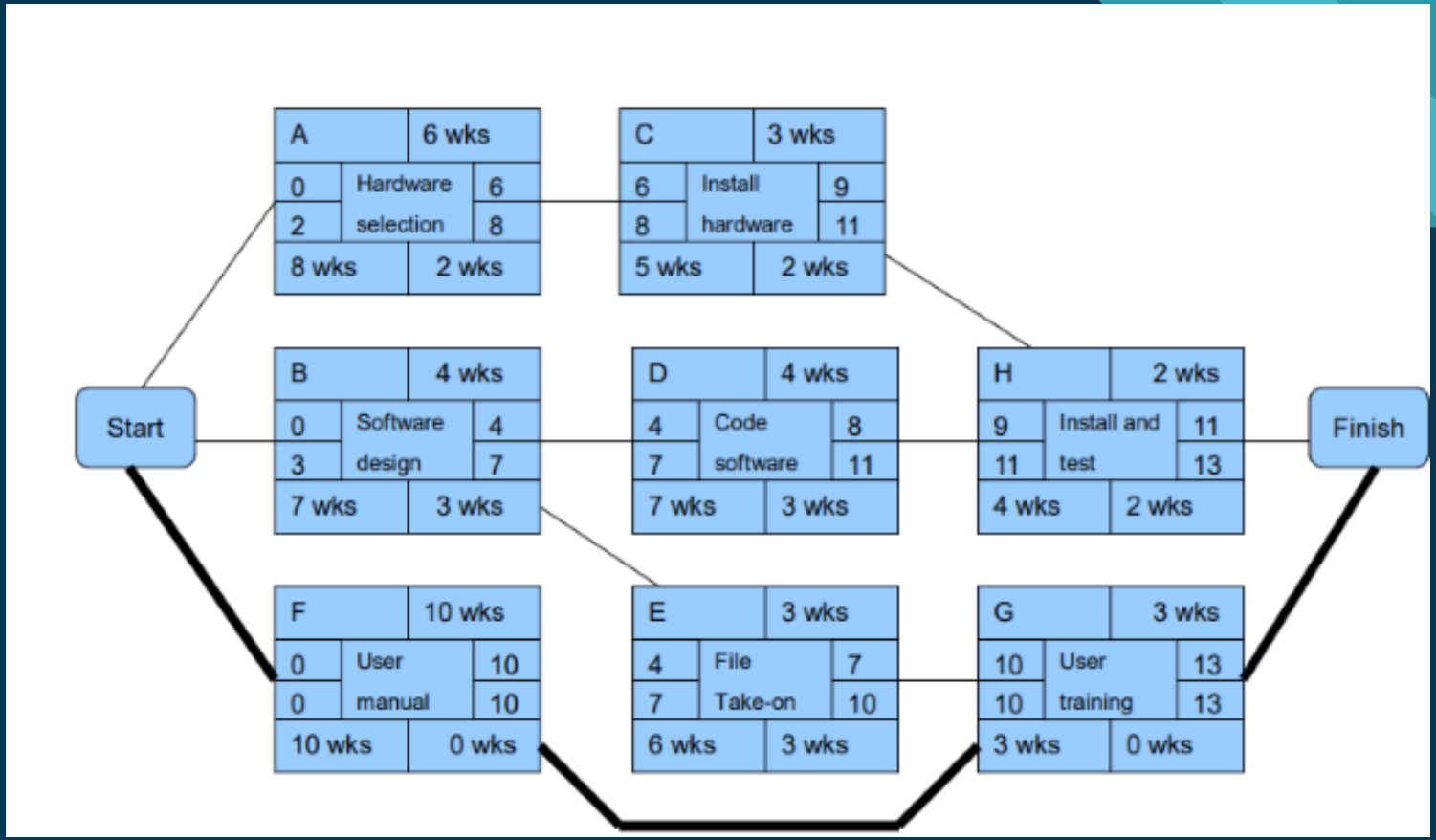
Resource allocation is used to assign the available resources in an economic way.

Resource requirements:

Activity	Resource	Notes
Hardware Selection	Project manager	approx 6 weeks
Installing hardware	Project manager	approx 3 weeks
Software Design	Software Architect	approx 4 weeks
Code the software	SDET, SA, PM	approx 4 weeks
Build & Testing	SDET	approx 2 weeks
Documentation	Project manager	approx 10 weeks
Alpha testing	SDET	approx 3 weeks
Beta testing	Government officials	approx 3 weeks
User training	Government officials	approx 3 weeks

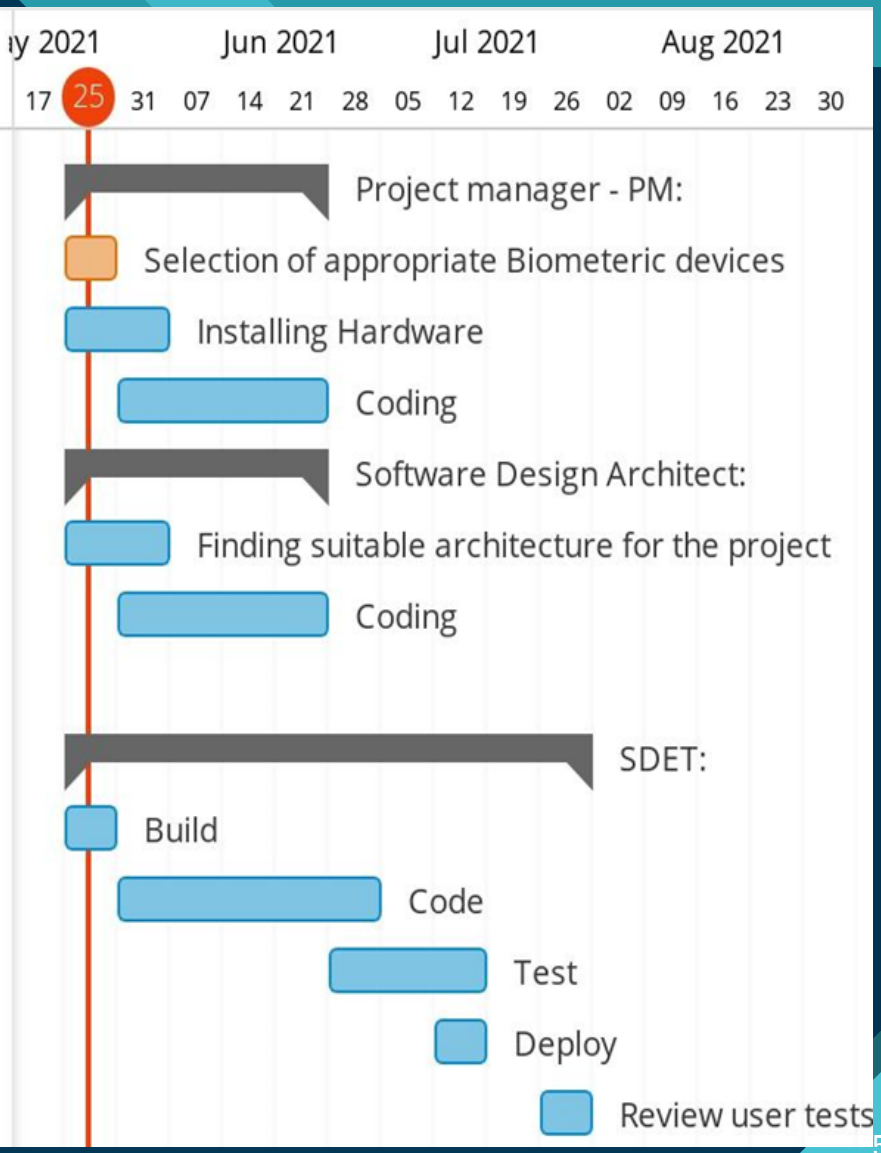
Resource Allocation:

Resource requirements:

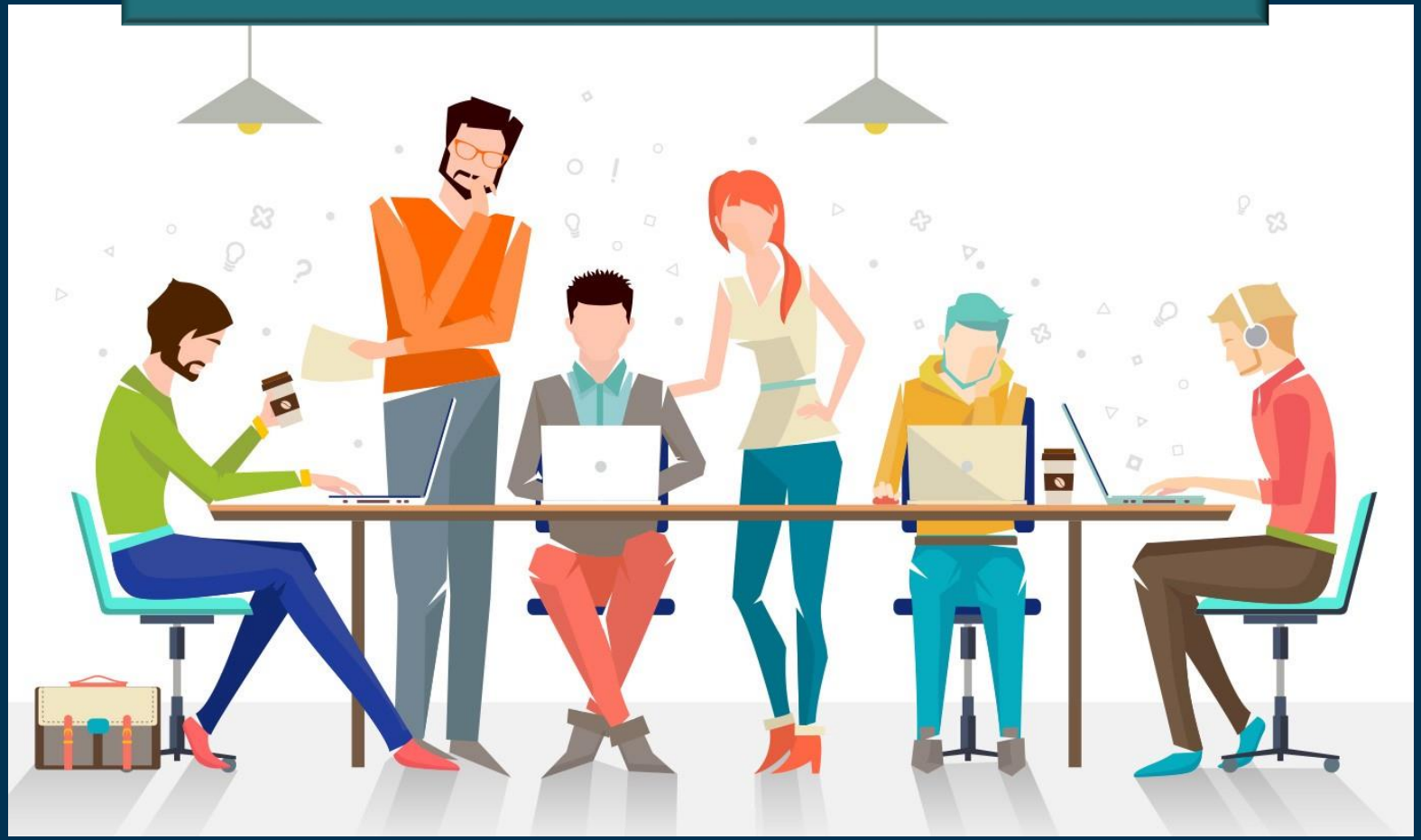


Resource Allocation

	ACTIVITIES	ASSIGNEE	EH	START	DUE	%
	Project manager - PM:		**24h**	**25/May**	**26/Jun**	**0%**
1	Selection of appropriate Bio...	Sabrina - PM	9h	25/May	30/May	0%
2	Installing Hardware	Sabrina - PM	9h	30/May	31/May	0%
3	Coding	Sabrina - PM	6h	01/Jun	26/Jun	0%
	Software Design Architect:		**14h**	**25/May**	**26/Jun**	**0%**
5	Finding suitable architectur...	Anuj - SA	8h	25/May	05/Jun	0%
6	Coding	Anuj - SA	6h	01/Jun	26/Jun	0%
7	Deploy	Anuj - SA	-			0%
	SDET:		**45h**	**26/May**	**30/Jul**	**0%**
9	Build	Vaibhav -SDET	9h	26/May	26/May	0%
10	Code	Vaibhav -SDET	9h	01/Jun	03/Jul	0%
11	Test	Vaibhav -SDET	9h	03/Jul	13/Jul	0%
12	Deploy	Vaibhav -SDET	9h	15/Jul	16/Jul	0%
13	Review user tests	Vaibhav -SDET	9h	30/Jul	30/Jul	0%



ORGANISING PEOPLE



People working under the project are divided into 3 teams. Each team is lead by one representative

Team A - Represented by Project Manager (PM) Sabrina
This team will handle selection of physical devices, Requirement elicitation, Coding, etc

Team B - Represented by Software Analyst (SA) Anuj
This team will handle forming an architecture and design for the software and is also responsible for coding.

Team C - Represented by Software Developer (SDET) Vaibhav
This team will handle debugging, building the complete software, coding, Testing, Reviewing User testing.

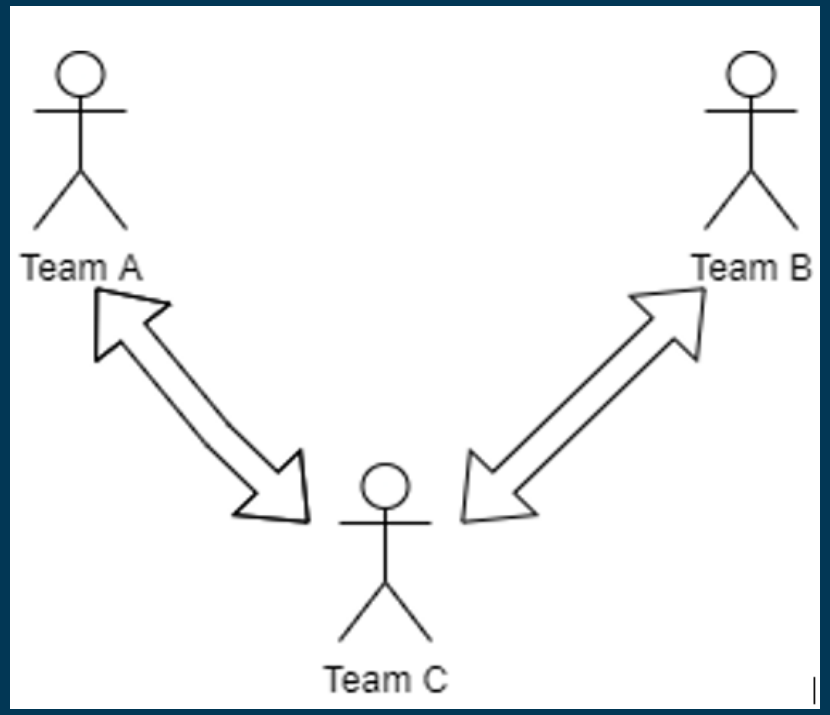
These three teams collaborate with each other and develop the software.

Team A consists of a **requirement engineers, junior developers**, etc who are responsible to select the appropriate hardware systems, install it and make sure it is properly coordinated with the software.

Team B consists of **Software Architects, Junior developers, SDEs** etc who are responsible to code the software and build appropriate architecture for the software.

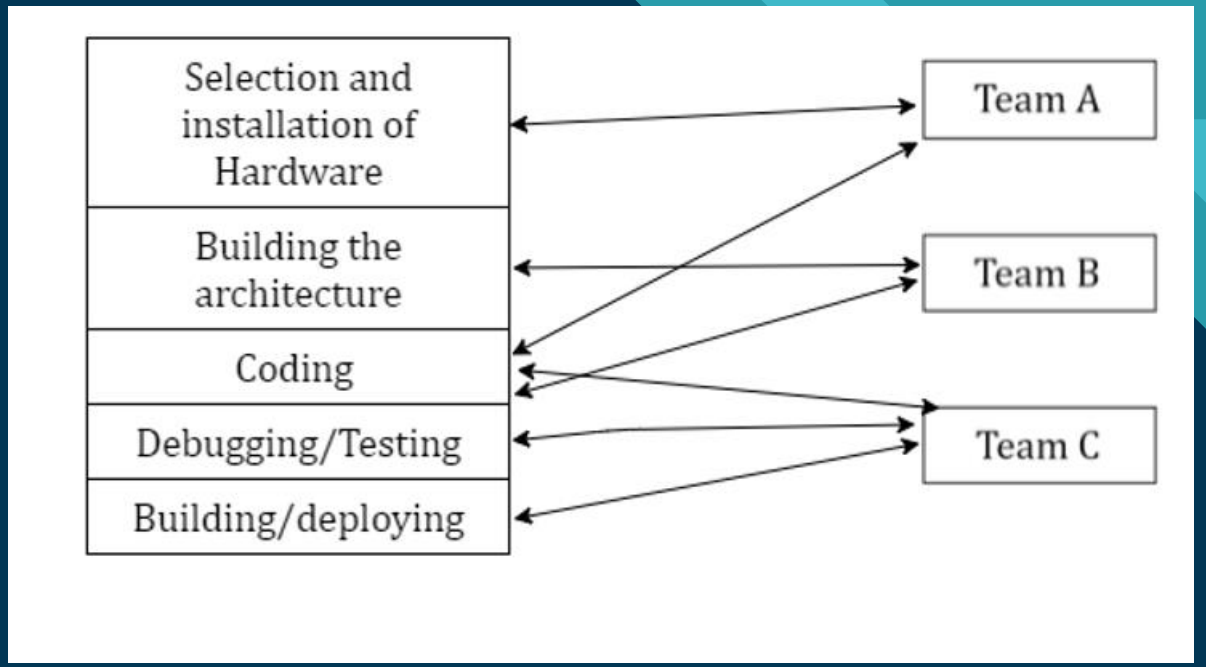
Team C consists of **SDETs, junior developers, SDEs, QAs** etc who are mainly responsible to develop the software and develop test cases for automated tests and other tests during the development.

TEAM STRUCTURE

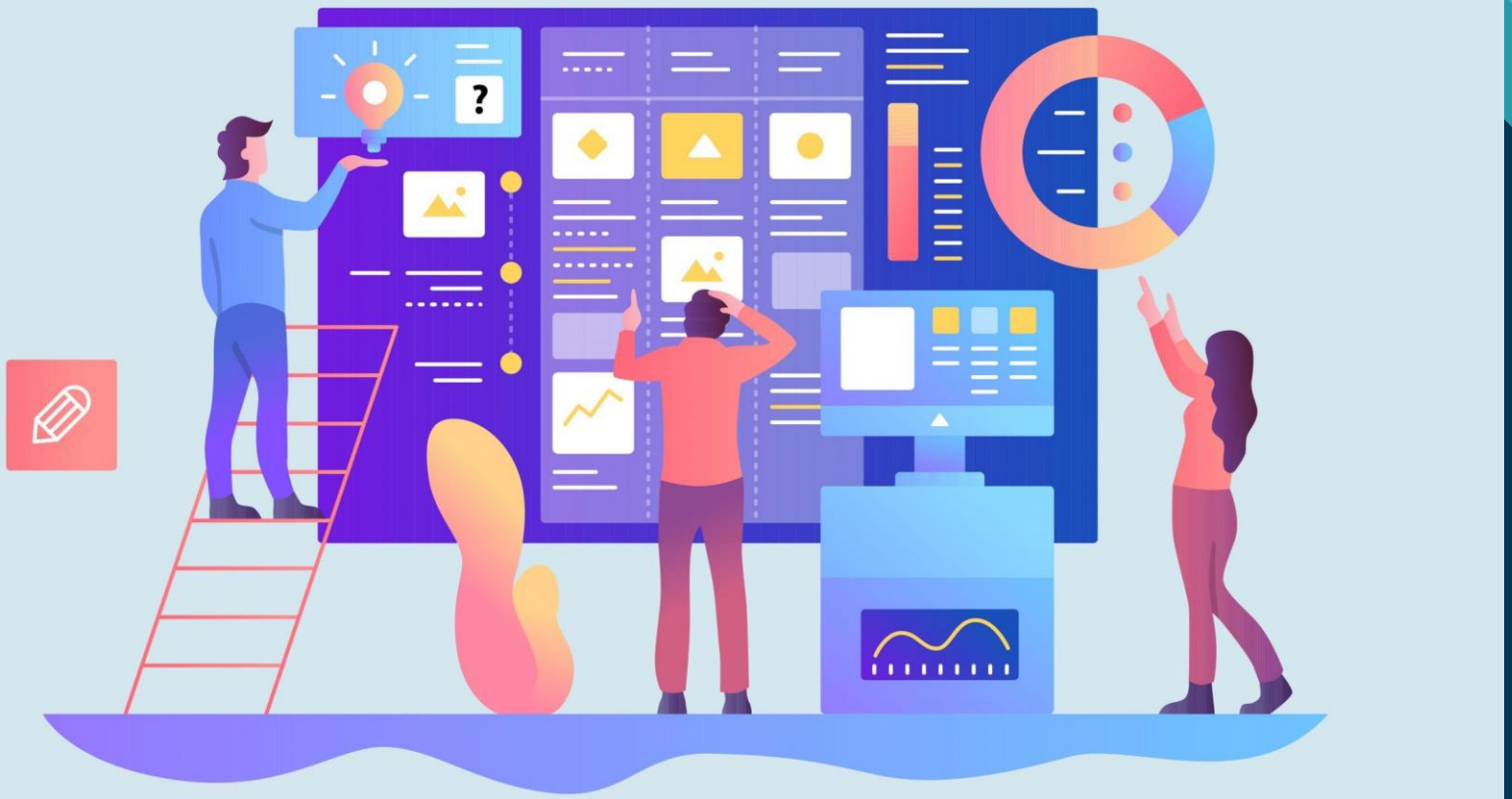


FUNCTIONAL GROUPS

TEAMS

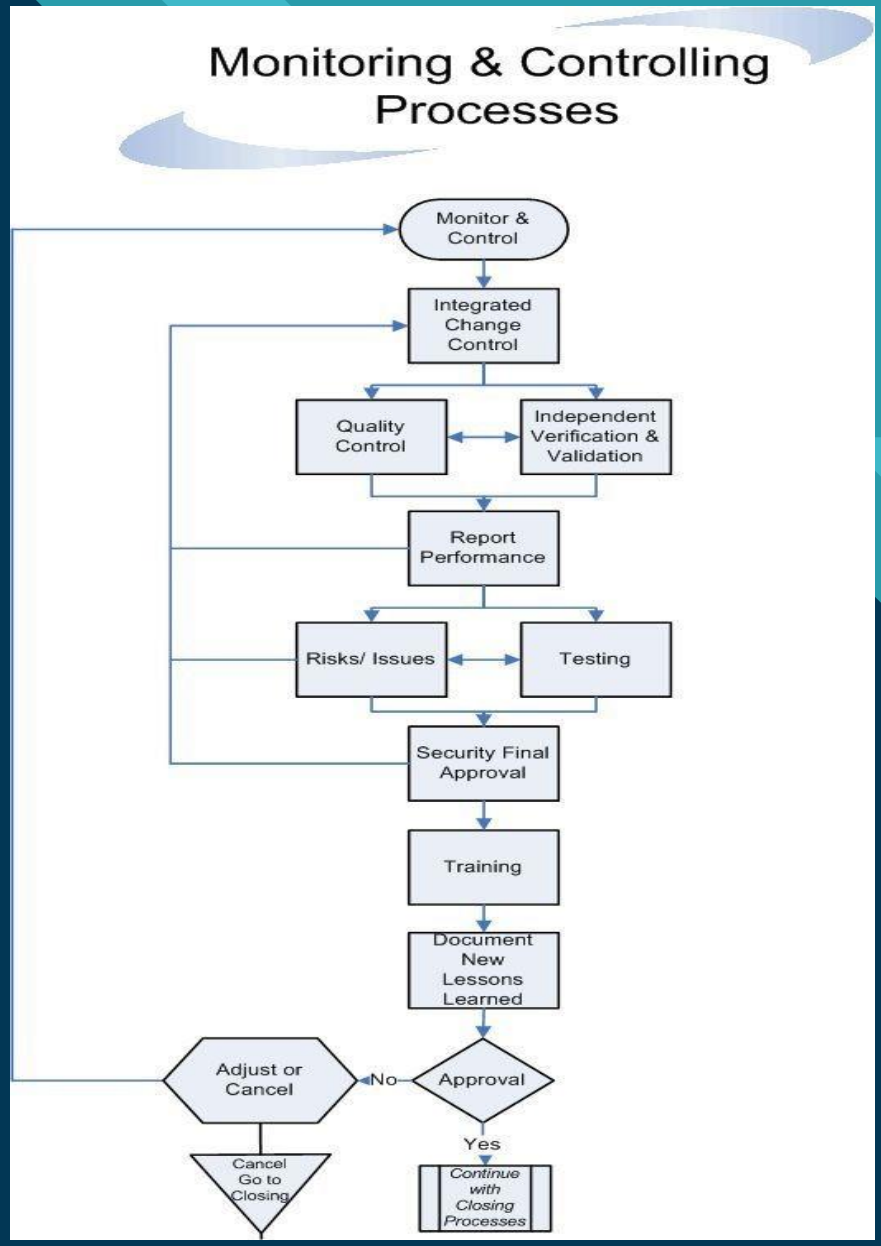


MONITORING PROJECT



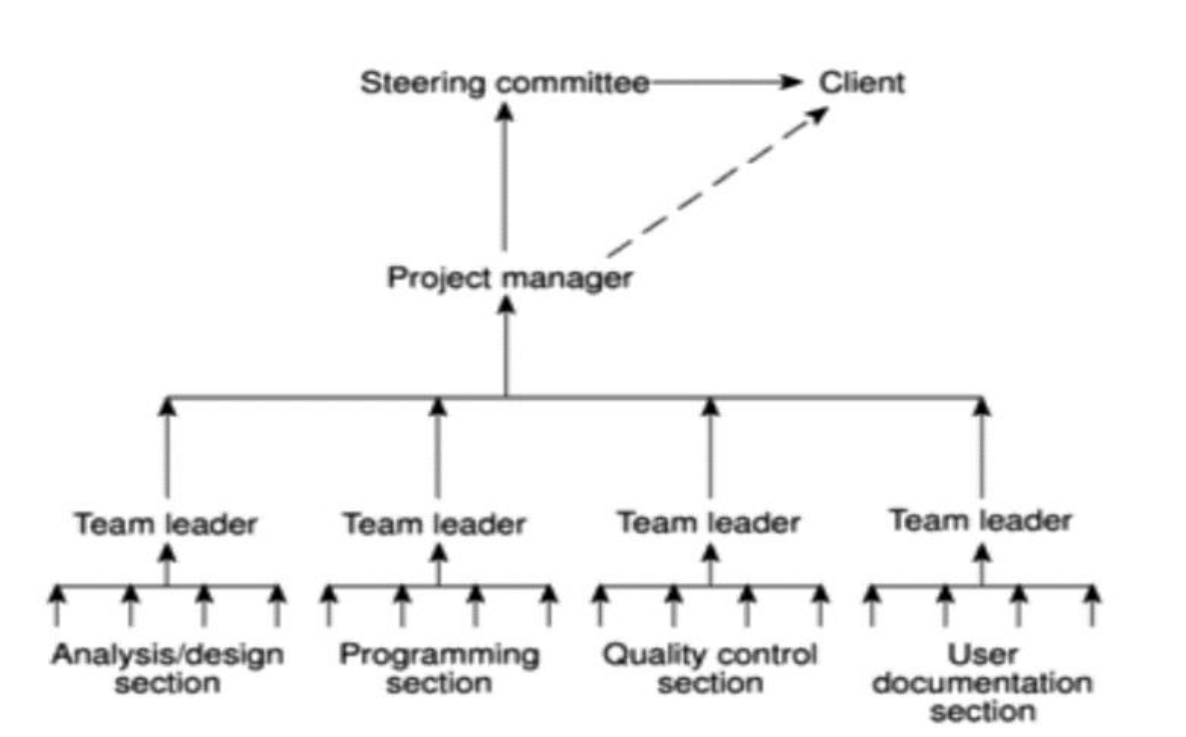
Monitoring and Controlling

They are processes needed to track, review, and regulate the progress and performance of the project. It also identifies any areas where changes to the project management method are required and initiates the required changes.



- **Responsibility:**

The overall responsibility for ensuring satisfactory progress on a project is often the role of the **Project steering committee** or **Project board.**



- **Assessing progress:**

Progress assessment will normally be made on the basis of information collected and collated at regular intervals or when specific events occur. One way of assessing process is through **Reporting.**

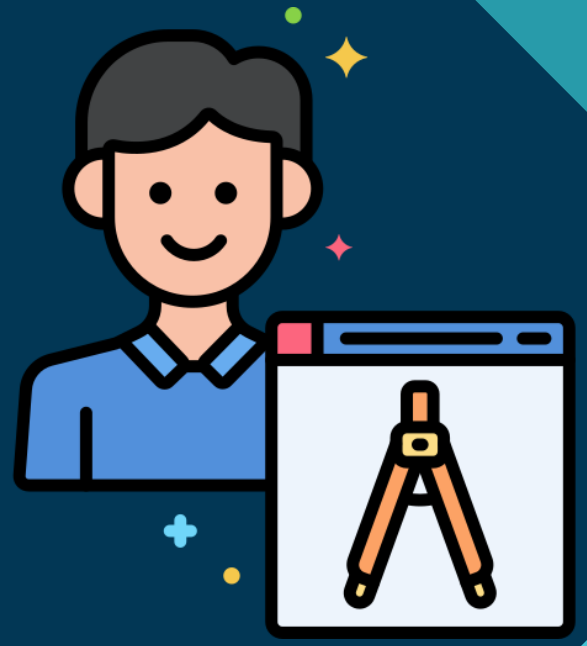
Report type	*Examples*	*Comment*
Oral formal regular	weekly or monthly progress meetings	while reports may be oral formal written minutes should be kept
Oral formal ad hoc	end-of-stage review meetings	while largely oral, likely to receive and generate written reports
Written formal regular	job sheets, progress reports	normally weekly using forms
Written formal ad hoc	exception reports, change reports	
Oral informal ad hoc	canteen discussion, social interaction	often provides early warning; must be backed up by formal reporting

- **Setting checkpoints:**

We plan on setting **monthly checkpoints** to monitor project.

- **Taking snapshots:**

Team leader will assess the progress daily whereas project managers will find weekly or monthly reporting.



Additionally, we plan on monitoring our project using the following ways:

1. Staff meetings - Weekly, Monthly, Annual
2. Partners meeting/Learning Forums (FGD, Surveys)/Retreat
3. Participatory Reviews - Stakeholders
4. Monitoring and Supervision Mission (Self/Donors/Joint)
5. Progress reports/Statistics

THANK YOU