**WEEK – 1**

**TOPICS COVERED**

1.Software Project Management

2.Software Engineering Management

3.Goals of Software Project

4.Principles of Software Project Management

5.Pitfalls

6.Characteristics of SP

7.Classification of complexity

8.Equilibrium Triangle

9.Software Engineering Models

10.Agile Project Management Model

11.Principles of Agile Project Management

12.Roles and Responsibilities

13.Software Project Maturity

14. IEEE Principles

**UNDERSTANDINGS**

1.Software Project Management

- Using skills and knowledge to complete a series of action.

- Time bound

- Resource bound

- Cost bound

2.Software Engineering Management

- Engineering the software project.

- Planning, Executing, Deployment and maintenance of a project.

3.Goals of software project

- Provability

to complete the project successfully

to learn the make a quality work.

to learn dos and don’ts

- Posterity

take away's from before projects.

4.Principles of SPM

- Recognize - know about the capital, revenue and the profit

- Have clear goals - vision is important

- Quality - top priority

- People - involve committed people for your work

- Point of max compressibility - should know the limits - don’t stretch beyond minimum time and cost

- Structure - reflects your organization

- Humble

- Fail-Safe Minimization - if you don’t know, don’t do

5.Pitfalls

- not establishing the goals clearly

- not communicating properly

- not mitigating risks

- delivery

- not leaving enough place for changes

6.Characteristics of software proj manag

- Piecemeal growth - gradually forming into shape (project requirements)

- Creativity - human intelligence is needed

- Controllability - not everything is under control - need to learn to let go

7.Classification of complexity

- Simple - uncertainty is low

- Complicated - uncertainty is high

- Complex - uncertainty is very high

- Chaotic - uncertainty is extreme (not ideal to work on the project)

How are these complexities measured?

- Structural - size and scope

- Sociopolitical - effects of the project inside and outside the organization

- Emergent - what's the outcome of the project?

8.Equilibrium Triangle

- Scope -defines the boundary of the project

- Quality - top prio

- Cost - defined budget or estimation

- Time - window of time within which the project should be completed

- Resource - physical (Human) or digital (data, applications)

9.Software Engineering Models

- 2 types of models

- IEE approved models

Stages

- Scope definition - find which can be implemented and which cannot be

- Planning

- Enactment - issues that might occur in the project

- Review

- Close - completion of the project

- Measurement - analysis of results

- Management Tools

10.Agile Project Management Model

- System that is open to change in all the phases of the project

Stages - Envision - project and team planning.

- Speculate - how will you deliver the project? - releases - features

- Explore - develop and deliver the feature or product

- Adapt - Change management

- Close - lessons learned

11.Principles of Agile Project Management

- Minimum Critical Requirement

- Autonomous teams

- Redundancy

- Learning

- Excellence

12.Roles and responsibilities

- Methodology Independent (Common through multiple domains)

-Project Manager

-Quality Assurance Coordinator

-Team Lead

- Methodology Specific Roles

-Product Owner

-Scrum Master

Skills of Project Manager

Model:1

-Planning, Scheduling, Staffing, Motivating and Controlling

Model:2

-Technical Skills, Leadership Skills, Business and strategic skills, Project manager competence (all these comes as a triangle)

13.Software Project Maturity and Immaturity

Maturity -

Level1 - Common Language

Level2 - Common Process

Level3 - Singular Methodology

Level4 - Benchmarking

Level5 - Continuous Improvement

Maturity level goes up hierarchically.

Immaturity -

Level0 - Negligent - ignoring all successful projects.

Level1 - Obstructive - not caring about software quality.

Level2 - Contemptuous - does not follow the good principles and rules.

Level3 - Undermining - critics other organization performances

14. IEEE Principles

- Products

Understanding of the requirements

ensuring that goals are achievable.

Good project management

Testing and debugging etc.

* Public

Disclose the dangers.

Put public intersect first.

* Judgement

No bribery

Conflict of interest

* Client and Employer
* Management
* Profession
* Colleagues
* Self

**TOPICS NEED TO BE EXPLORED**

1.Evolution of software engineering

2.IEEE Standards of software engineering

**ACTIONS**

1. Read through the separate PDF for IEEE standards and understood. (still need to work on)
2. Walkthrough all the topics for the week

**WEEK – 2**

**TOPICS COVERED**

1.Software Project Assessment

2.Motivation of studying the project failures

3.Cost of Software Project Failure

4.Challenges in studying the software failures

5.Understanding the outcome of SP

6.Recovery Approach

7.Model of Level of success

8.Project Retrospectives

**UNDERSTANDINGS**

1.Software Project Assessment

- Two views – 1. Delivery Viewpoint

2. Progress Viewpoint

Delivery Viewpoint - Successful – all success criteria are within the acceptable range.

Challenged –some are in acceptable range.

Failed – product is not delivered at all.

Progress Viewpoint – progress on specific state of a project.

2.Motivation of studying the project failures

1.Learning – learning the dos and don’ts from failure

2. Rationalizing

- Feasibility Study (TELOS) – Technical, Economic, Legal, Operational, Schedule

- Laws of Feasibility Study

- Positive and Negative force (risks are higher, project is not feasible)

- Dependencies (high dependencies btwn tasks, project is not feasible)

- Points of vulnerability (weak remedies for risks, project not feasible)

- Forces of production (not under control for production, project not feasible)

- Law on conflicts (more conflicts with people involved, not feasible)

- Law of complexity (more complex, more risk so not feasible)

3.Driving – Using these learning as checklist for next projects to avoid these occurred issues.

3.Cost of Software Project Failure

Failure comes with costs

* Capital – investment is gone in case of failure.
* Market – share value and client are lost.
* Reputation – internally and externally its affected.
* Goodwill – relationship with clients and contractors are lost.
* Professional Carrer – losing the job, project and so on.

4.Challenges in studying the software failures

1. Related to assessing – self serving bias and egocentric bias

- expose inadequacies

- cannot secure the findings

2. Related to publishing – loss of reputation

- competitors get info on the potential failure so they avoid it

- legal issues from the previous clients

5.Understanding the outcome of SP

1.Success - does not leave the zone of success.

2.Challenged – leaves the zone of success for a period through the project timeline but ends inside the zone of success.

3.Failed – exit the zone of success.

- Partially Failed – some reusable knowledge or assets

- Totally Failed – no learning at all.

6.Sucess of Software Project - Success factor differs person to person.

Failure of Success – success is not free; it comes with cost.

- though the project is successful, certain points are considered to be failed (e.g., poor project management, people don’t choose the same manager to work with again)

Success Criteria

1.Define the business objectives

2.Identify the stakeholders and expectations

3.Identify project constraints

4.Define success criteria

Challenges in formulating the success criteria.

1. Variety of perception on success – different people have different perception of success.
2. Multi – Dimensionality of success
3. Quality of Success Criteria
4. No sufficient success criteria

6.Recovery Approach

1.Escalation of commitment

- outcome of the escalation are 1. No guarantees 2. Disruptive effect which leads to communication complexity.

-Unavailability of resources -failing to the promise leads to re direction of the resources

2.Catastrophe disentanglement Process

- assign a person to evaluate the project and the team

-determine the minimum goals which are attainable

- perform risk assessments and get the job done.

7.Model of Level of success

Level of success is measured even when the project is failed by the following metrics.

Level 1: Project Management Success - how was the management (manager, team, organization)

Level 2: Project Success – what’s the outcome of the project?

Level 3: Business Success - Was the business satisfied by the outcome (Successful/Failed)

Level 4: Future Potential – Do we have any potential improvements on the project?

8.Project Retrospectives - what’s the outcome/learning of the project?

- Keep doing - Less of - More of - Start Doing - Stop doing

**TOPICS NEED TO BE EXPLORED**

NIL

**ACTIONS**

General walkthrough

**WEEK – 3**

**TOPICS COVERED**

1.Stakeholder

2.Motivation of Stakeholder Analysis

3.Stakeholder Management

4.Challenges in Identifying the Stakeholders

5.Source for identifying the stakeholders

6.Classification of Stakeholders

7.Negative Stakeholders

8.Prioritization of Stakeholders

9.Stakeholder Models

**UNDERSTANDINGS**

1.Stakeholder

- person who affects the project or affected the project

- can be an individual or group or organization

2.Motivation of Stakeholder Analysis

software projects are influenced by the stakeholders.

* Understanding the Ecosystem: knowing the market, where your stakeholder stands in the market, new methodologies and tools.
* People Factor: know people’s interests and bring projects accordingly.
* Dimension of Software engineering: where does the project stand?
* Dimension of Requirements: Correct identification of stakeholders.
* Understanding the belief system of the team
* Understanding the people who you are collaborating with.
* Purpose of the software – why it is made? What’s the impact?
* Scope of the project
* Value of the project – both internal and externally (Social/politically)
* Outcome and organizational change

3.Stakeholder Management

It’s difficult to manage the stakeholders for 2 reasons.

1.Tractability – due to lack of transparency.

` 2.Variability – involved in multiple domains and processes.

4.Challenges in Identifying the Stakeholders

1.Incorrectness – unwanted stakeholders are involved in the project

2.Incompletness – necessary stakeholders are left behind.

3.Oversizing – Involving both necessary and unnecessary stakeholders increasing the size which affects the communication

5.Source for identifying the stakeholders

1. Organizational Chart – external stakeholders cannot be identified.
2. Similar Projects – involves cost for reuse.
3. Communities of Practice – people may move out to another domain and not update the group.
4. Context Analysis – difficult to acquire knowledge about domain.
5. Social Web Analytics – stakeholders and their relationship can be defined to some extent.
6. Question-Directed Brainstorming and Discussion - by asking relevant questions.

6.Classification of Stakeholders

- By views: Contribution, Product, Contactual, participation, impact and outcome view.

- By roles: RACI model

- By Salience: power, legitimacy and urgency

7.Negative Stakeholders

- threat to the project or the organization in any form.

- peaceful/hostile, lawful/unlawful, insider/outsider

8.Prioritization of Stakeholders

They are prioritized by 1. Influence 2. Importance.

Based on the probability against Influence and importance, they are classified as

* Major - Minor - Critical

9.Stakeholder Models

1.Satellite Stakeholder Model

-Elicit Stakeholder Classes

-List Salient Properties in Each Stakeholder Class.

-Elicit Relationships between Stakeholder Classes

2.Circle Model

-Upwards

-Outwards

-Downwards

-Sidewards

10. States of Stakeholders

-Identified

-Classified

-Represented

-Involved

-In Agreement

-Satisfied with deployment

-Satisfied in use

**TOPICS NEED TO BE EXPLORED**

1.Stakeholder Models

**ACTIONS**

1. General walkthrough
2. Explored the satellite model and the circle model. Circle model seems to be easier.

**WEEK – 4**

**TOPICS COVERED**

1.Estimation

2.Motivation of Cost Estimate

3.Challenges in software project cost estimation

4.Stakeholder – SP Cost Estimation

5.Understanding Estimates

6.Quality of Estimation

7.Factors Impacting the quality of estimation

8.Cone of Uncertainty

9. Relative Error of an estimate

10.Estimation Quality Factor

11.COCOMO – I

**UNDERSTANDINGS**

1.Estimation

- prediction of cost.

- non - zero probability of coming true

2.Motivation of Cost Estimate

- Feasibility Study: is it possible to complete the project within the given cost?

- Budgeting: planning the portion of amount to different groups involved in the project.

- Trade-Offs: potential cutoffs

- Risk Analysis: Estimation of the risk and the cost involved

- Creating Pedigree: preserving historical data

- Collaborative Learning and Improving: feedback and learning

3.Challenges in software project cost estimation

1.Complexity - uncertainty in ecosystem

- communication between them

- frequency of changes

2.Human-Dependency - Not everything can be attained by AI, human intelligence is required.

3.Circularity – manifestation of catch-22

4.Psychology – it has its own social and political pressure

4.Stakeholder – SP Cost Estimation

- Stakeholders are also involved in cost estimation.

- Who produces an estimate? Who consumes an estimate?

Management aspects of stakeholders

1. Domain Expert – do not have knowledge in estimation. They give insights into the domain.
2. Estimation Process Owner – responsible for the complete estimation process.
3. Estimator – who gives the estimates.
4. Product Owner - the owner of the product on which the estimates are proposed.

5.Understanding Estimates (Ref material for formula and calculation)

6.Quality of Estimation

- Consistency

- Dependability

- Axiology

7.Factors Impacting the quality of estimation

- Inaccurate estimation due to political, psychological, technical.

- uncertainty

- Living with pitfalls

- not knowing the granularity

- not knowing the possibility

8.Cone of Uncertainty

- Project milestones

- cost

Uses of Cone of Uncertainty - Has business value

* Cost engineer
* Cost management

9. Relative Error of an estimate

Formula - RE = A-E/ A.

Outcome – Positive – estimate is smaller than the actual value – value is between 0 and 1.

Negative – estimate is larger than the actual value.

Mean Relative and Magnitude – Refer Pg – 29

10.Estimation Quality Factor

- to access the quality of prediction

- EQF = Area of Perfect Estimate /Area of Deviations from Perfect Estimate

11.COCOMO – I

Used for effort estimation.

Types – Organic

Semi-detached

Embedded

Estimation Types – Basic, Intermediate, Detailed

**TOPICS NEED TO BE EXPLORED**

1. Relative Error Estimate (All calculative parts)
2. COCOMO model

**ACTIONS**

1. Walkthrough of all the topics discussed in the class.
2. Watched YouTube videos for better understanding of COCOMO model.
3. Need to explore about the relative error estimates.

**WEEK – 8**

**TOPICS COVERED**

1. Teams
2. Motivation for teams
3. Characteristics of teams
4. Team Philosophy
5. Team Configuration
6. Team Composition and Size
7. Team Development
8. Team quality
9. Decision making
10. Characteristics of Team Leader

**UNDERSTANDINGS**

1.Team

- Group of people

- work towards a same purpose

- common goals

2.Motivation for teams

- less time taken to complete the task

- multiple domain knowledge people work together, so knowledge is high

- focus on important work

3.Characteristics of teams

- Holism: less is more

-Goal: target to attain as a group

4.Team Philosophy

- Cross functional team: multiple teams contribute to one project

- Autonomy: Independent, Empowered, Accountable, Collaborative, Transparent

5.Team Configuration (Ref Dia in Pg 10)

6.Team Composition and Size

- Too small – lack expertise

- Too large – managing the team becomes difficult

7.Team Development

- Tuckman Model – 7 theories

1. Forming: ice breaker

2. Storming: tasks are given

3. Norming: way of working is defined

4. Performing: performance as a team

5. Adjourning: end of project, looking for same team for next project.

- Allocation of Responsibilities: find the right person and allocate the responsibilities. Skills are taken into consideration.

- Scoping: finding the scope of the project, delivering what’s been promised

- Hogging: same person doing all work is unacceptable

- Mobbing: cornering a team member or ganged up against a person

8.Team Quality

2 models

1. Model – I

-Adaptability

-Stability

- Unity

2. Model -II

- Psychological safety

- Dependability

- Structure and clarity

- Meaning

- Impact

9.Decision Making

- Compromises and conflicts

- Hot conflicts: emotional

- Cold conflicts: not emotional

- Conflict resolution model: competing, collaborating, avoiding, accommodating

10.Charateristics of Team Leader

- Communicative

- anticipate

- manage stress

- manage conflicts

- approachable

Leadership Style –

1. Dictatorial – one man show, decides on their own.
2. Analytical – decides by analysis.
3. Affiliative – gets team members decision before making decisions.
4. Democratic – encourages team members to participate in decision making.

11.Team Members

- A chain analogy

- Dominator: Good leader

- Influencer: good communication

- Supporter: good team player

- Critical Thinker: Data analyst, developer

12.Blooom’s Tax anomy

- Remember: define, list, recognize, repeat

- Understand: explain, interpret, summarize

- Apply: demonstrate, execute, operate

- Analyze: question, compare, organize

- Evaluate: check, correct, justify, defend

- Create: design, develop

**TOPICS NEED TO BE EXPLORED**

NIL

**ACTIONS**

Walkthrough of all the topics discussed in the class.

**WEEK – 9**

**TOPICS COVERED**

1. Risk
2. Motivation for studying SRM.
3. Types of Risk
4. Models of Risk
5. Characteristics of Risk
6. Scope of SRM.
7. Classification of Risk.
8. Risk Management in Agile Methodologies
9. Risk Management Process
10. Risk Identification
11. Risk Register
12. Risk Analysis
13. Risk Exposure
14. Risk Monitoring

**UNDERSTANDINGS**

1.Risk

- potential adverse circumstances.

- if not addressed properly, it can impair the parts of the project

2.Motivation for studying Software Risk Management

- Risk is Ubiquitous

- Risk is Inherent to Engineering Inventions

- Reduce the Chances of Software Project Failure

- Proactive, Not Reactive

3.Types of Risk

- Unknown unknown (Black swans): unknown risks to the risk analyzer

- Unknown known (Grey swans): can be identified but not anticipated by the analyzer.

- Rare Known: known risks

Limitation 🡪 Weakness 🡪 Vulnerabilities 🡪 Threats 🡪 Risks

4.Models of Risk

Model – I

* Consequences of association class
* Risk involves assets (tangible or intangible)

Model – II

* Cause and effect pair
* Threat is cause.
* Consequences are effects.

5.Characteristics of Risk

- Risk and time: function of time (future)

- Risk and event: already occurred or certain it will occur

- Risk and knowledge: uncertainty in knowledge

6.Scope of SRM

- Organization Risk: risk to entity or business

- Project Risk: risk to successful completion of the project

- People: risk due to people involved in development or maintenance

- Process: risk to the development

- Product: risk to successful installation or use of the product created

7.Classification of Risk

- Technical: hardware, software, technology

- Resource constraint: cost, time, quality

- Organizational: management support and involvement

- Other: legal, environmental, cultural.

8.Risk Management in Agile Methodologies

- DSDM: change management

- SCRUM: user stories, meetings, regular feedback

- XP

9.Risk Management Process

Risk Assessment

- Identification: describing risks related

- Analysis: likelihood of occurrence and impact

- Prioritization: scheduling attention

Risk Control Aspect

* Planning: contingency actions, what should we do if it happens?
* Resolution: Who takes care of what? (roles)
* Monitoring: tracking and assessing

10.Risk Identification

- Analogy: risk types recur

- Brainstorming: risks be explicitly known to the stakeholders

- Causal Mapping: where a cause is a sufficient, but not necessary

11.Risk Register

- record of information about identified risks

- transparency

- revisited, curated, and updated

- not a substitute for human decision making

12.Risk Analysis

- Quantitatively - numerical data is present - the likelihood of occurrence can be expressed in terms of numbers - to build a quantitative model.

- Qualitatively - likelihood of occurrence and/or impact can be specified on an ordinal scale.

13.Risk Exposure

RE is given by the following: RE = Probability of Occurrence × Impact of Risk Event.

14.Risk Monitoring

- tracking the status of risk item

- action taken to address it

- tracking can either be manual or automatic

**TOPICS NEED TO BE EXPLORED**

NIL

**ACTIONS**

Walkthrough of all the topics discussed in the class.