CSE4708: Software Project Management

Unit III : Activity Planning & Risk Management

Topic:

Risk Management

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Delivered on: 15th October 2020

Risk Management

MUST READ

- Risk Management documents (below documents are uploaded on Google Classroom)
  - Chapter 6 : Risk Management, Software Engineering – A practitioner's approach, Roger S. Pressman, 5th Edition
  - A document on Risk Management

Risk Management

- Risk management is critical to the success of any software project.
- The project schedule is the core of the project planning.
- In the software project development process, risk scheduling is one of the most significant disciplines.
- Also, evaluating risks to the schedule is complex.

Risk Management

- Risk is a probability of occurrence of some unwanted and harmful event to the project.
- These events can result in cost overruns, schedule slippage, or failure to meet their project goals.
- Risk is the possibility of loss.
- It is a function of both the probability of hazard's occurring and its impact on the project.

Risk Management

- A risk is the precursor to a problem; the probability that, at any given point in the software life cycle, the desired goals cannot be achieved within available resources and time.
- Identification of assessment of risks is very cumbersome task.
- Risk cannot be eliminated from software, but it can be managed.

Risk Management

- Risk management is critical to the success of any software project.
- The objective of risk management is to avoid or minimize the adverse effects of unforeseen events by avoiding the risks or drawing up contingency plans for dealing with them.

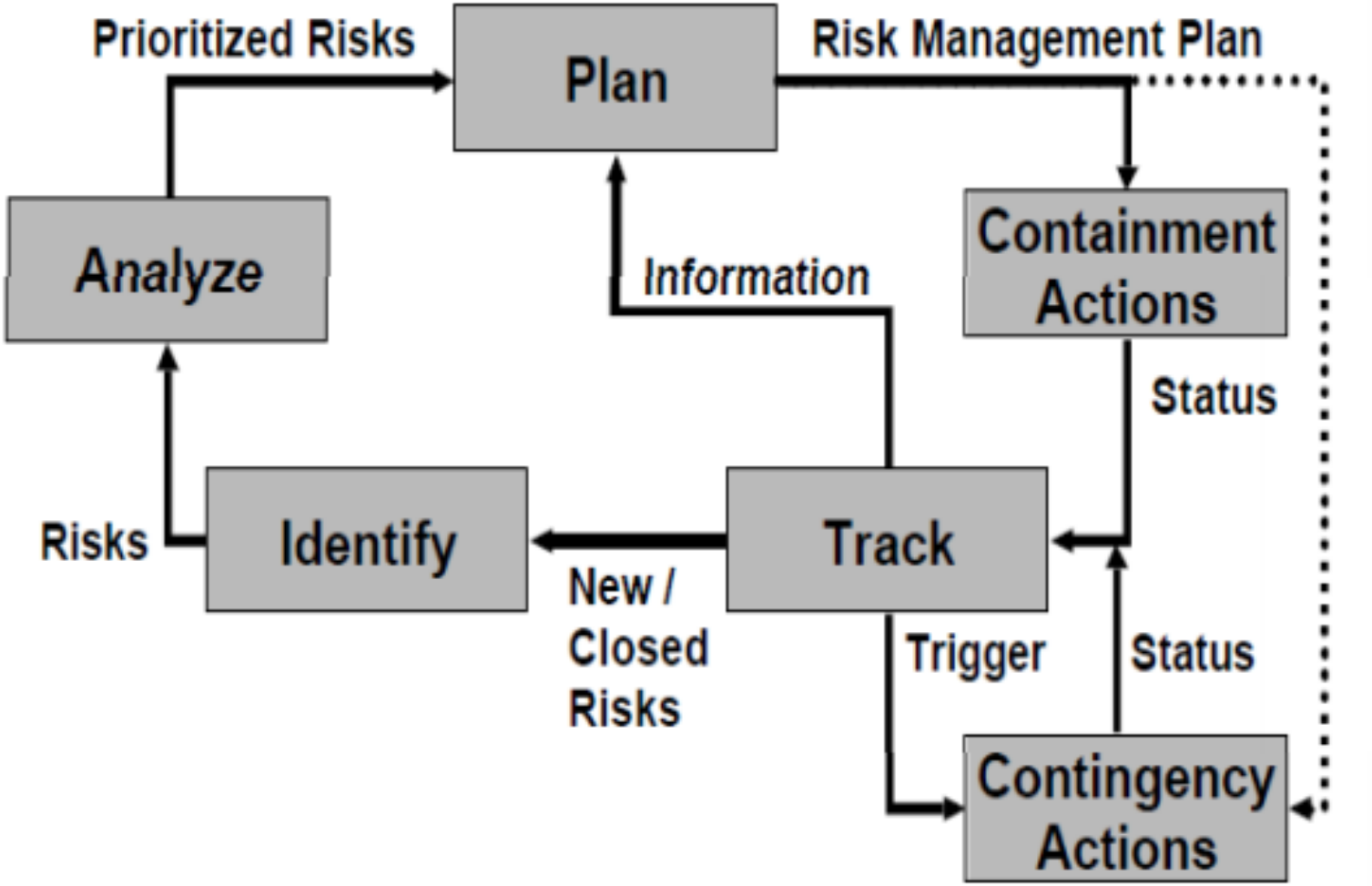
Risk Management

- Boehm defines four major reasons for implementing software risk management:
  - Avoiding software project disasters, including run away budgets and schedules, defect-ridden software products, and operational failures.
  - Avoiding rework caused by erroneous, missing, or ambiguous requirements, design or code, which typically consumes 40-50% of the total cost of software development.
  - Avoiding overkill with detection and prevention techniques in areas of minimal or no risk.
  - Stimulating a win-win software solution where the customer receives the product they need and the vendor makes the profits they expect.

Risk Management

- The risk management process starts with the identification of risks.
- Each of the risks is then analyzed and prioritized.
- A risk management plan is made that identifies containment actions to reduce the probability of the risk.
- The plan includes contingency actions that will be taken if the risk turns into a problem.
- The next step involves monitoring the status of known risks as well as the results of risk reduction actions.

Risk Management



Risk Management Process

STRATEGIES FOR SCHEDULE RISK ANALYSIS

- PERT requires three estimates - Optimistic Time, Most Likely Time, Pessimistic Time.
- **Optimistic Time (to)**: The optimistic time is the shortest possible time in which the activity can be completed.
- **Most Likely Time (tm)**: The most likely time is the normal amount of time the activity would take.
- **Pessimistic Time (tp)**: The pessimistic time is the longest time the activity could take if everything goes wrong.

STRATEGIES FOR SCHEDULE RISK ANALYSIS

- **Compute mean time (μ_k) and variance (σ_k^2) for each activity .**

Mean time = (Optimistic + 4 * Most likely + Pessimistic)/6

$$= (t_o + 4t_m + t_p)/6$$

The variance is given by:

Variance = [(Pessimistic - Optimistic) / 6]^2

$$\sigma_k^2 = ((t_p - t_o)/6)^2$$

STRATEGIES FOR SCHEDULE RISK ANALYSIS

- **Determine the critical path and critical activities through network** - Critical path is the longest path through the network. The whole project falls behind schedule if something falls behind schedule on the critical path. Critical activities are the activities that lie on the critical path.

STRATEGIES FOR SCHEDULE RISK ANALYSIS

Estimate the probability of risk during project completion –

(i) Calculating the z values - Given a scheduled time (ST) for completing the project, the z value can be computed as -

$$z = \frac{\text{(Scheduled time} - \sum \text{mean time of critical activities)}}{\sqrt{\sum \text{variance of critical activities}}}$$

STRATEGIES FOR SCHEDULE RISK ANALYSIS

(ii)Converting z values to probabilities - The z value can be converted to probability of risk of not completing the project on time by using standard normal probability table or graph.

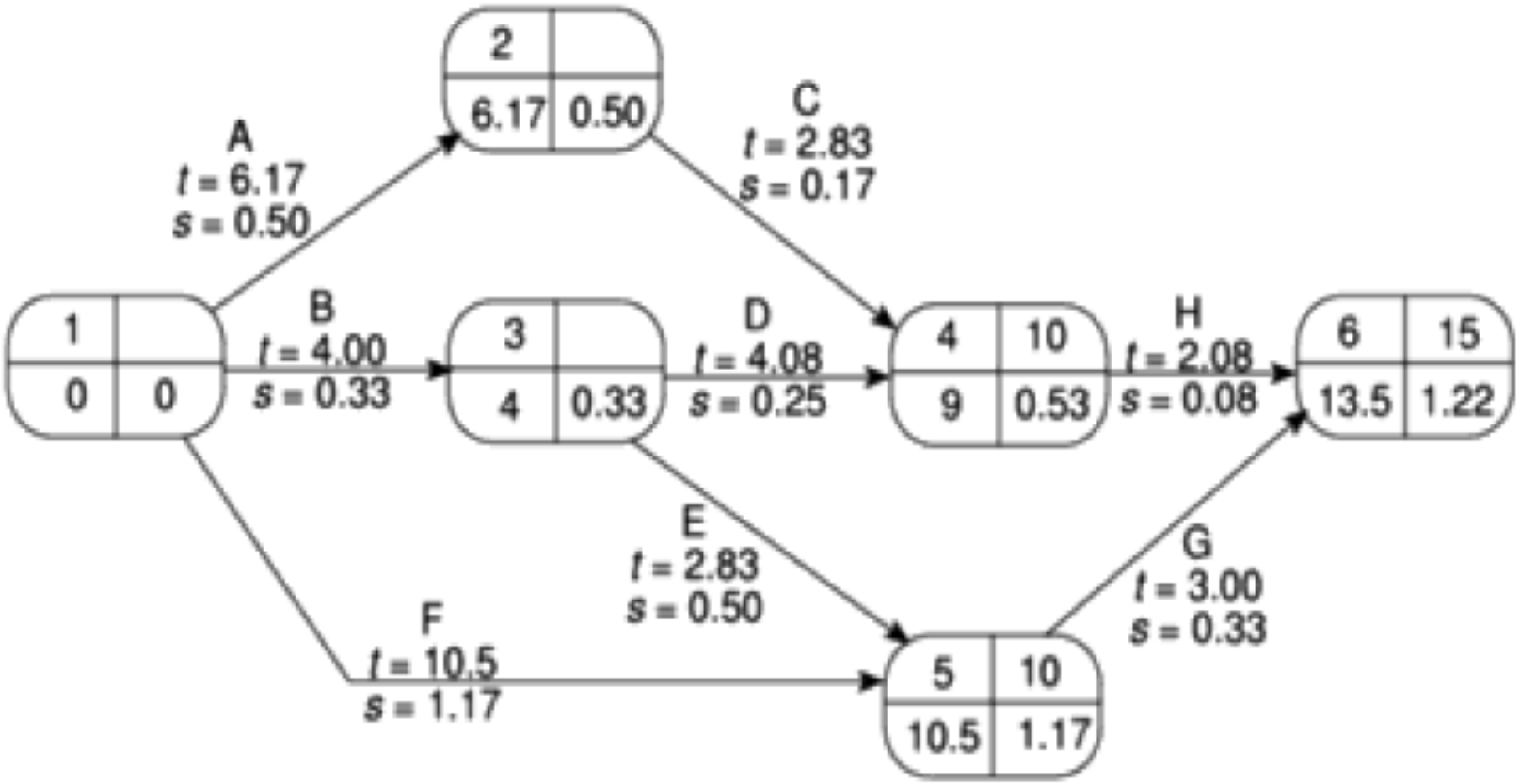
STRATEGIES FOR SCHEDULE RISK ANALYSIS

Example

Activity	Activity durations (weeks				
	Optimistic (a)	Most likely (m)	Pessimistic (b)	Expected (t_e)	Standard deviation (s)
A	5	6	8	6.17	0.50
B	3	4	5	4.00	0.33
C	2	3	3	2.83	0.17
D	3.5	4	5	4.08	0.25
E	1	3	4	2.83	0.50
F	8	10	15	10.50	1.17
G	2	3	4	3.00	0.33
H	2	2	2.5	2.08	0.08

STRATEGIES FOR SCHEDULE RISK ANALYSIS

PERT With 'SD'



STRATEGIES FOR SCHEDULE RISK ANALYSIS

- The PERT Technique uses the following three step method for calculating the probability of meeting or missing a target date:
  - Calculate SD of each project event
  - Calculate the Z value for each event that has a target value
  - Convert Z values to a probability

STRATEGIES FOR SCHEDULE RISK ANALYSIS

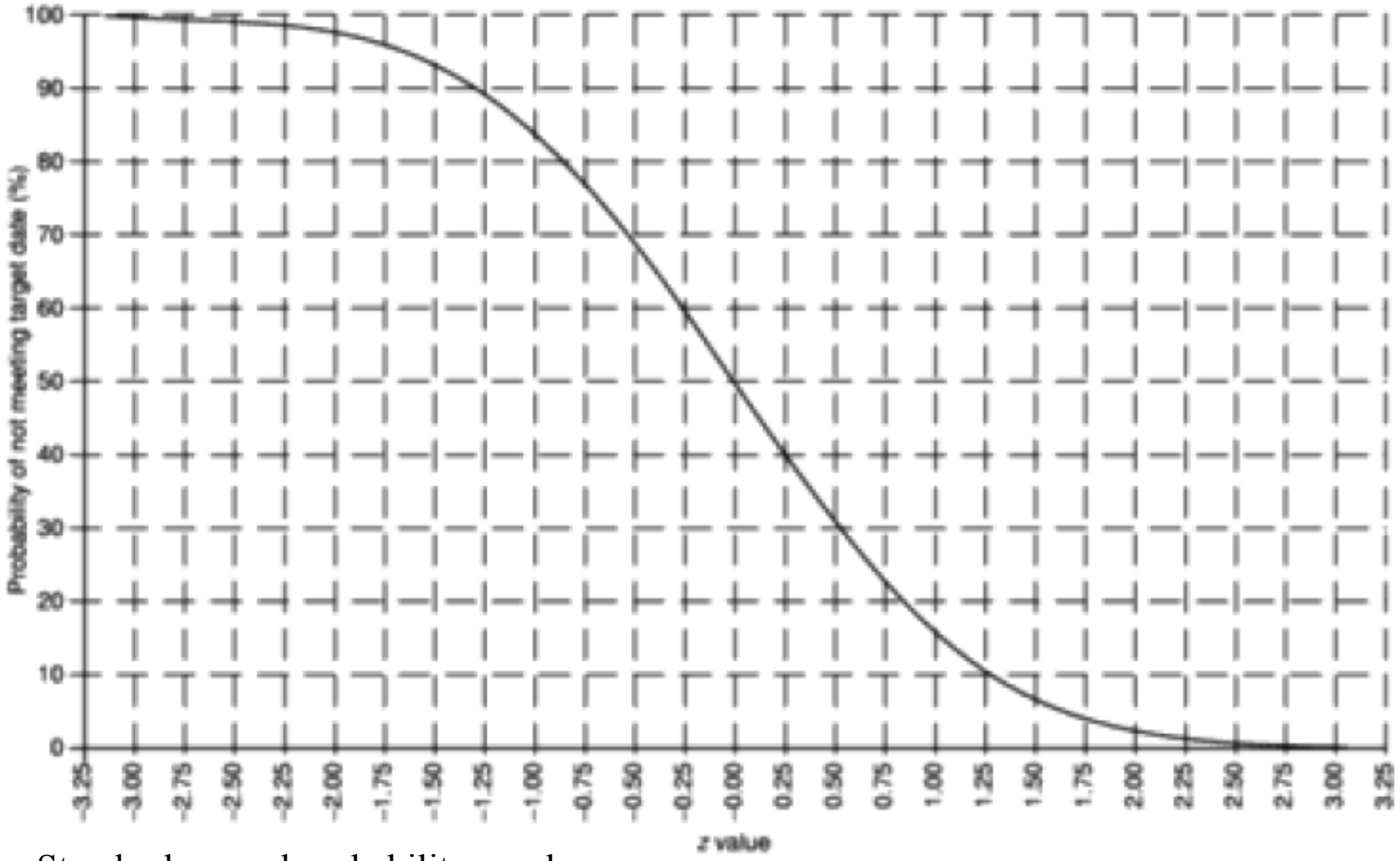
- Note: To add two Standard Deviations we must add their squares and then find the square root of the sum.
- The SD for event 3 depends on the activity B. The SD for event 3 is therefore 0.33
- For event 5 there are two possible paths, B+E or F. The total SD for path B+E is $\sqrt{(0.33^2+0.50^2)} = 0.6$ and For path F is 1.17
- SD for event 5 is therefore the greater of two 1.17

STRATEGIES FOR SCHEDULE RISK ANALYSIS

$$Z = \frac{T - t_e}{S}$$

- T_e → is the Expected Date
- T → Target Date
- S → SD

STRATEGIES FOR SCHEDULE RISK ANALYSIS



Standard normal probability graph

Converting Z values to Probabilities

- A Z-value may be converted to the probability of not meeting the target date by using the graph.
- Eg:
  - The Z-Value for the project completion (event 6) is 1.23. Using graph this equates to a probability of approximately 11%, that is, there is an 11% risk of not meeting the target date of the end of week 15.