Policies:

- Risk management Plan
  - → Methods to identify, profile, asses, monitor and handle risks
  - → Risk officer → not pm, oversee project risks
  - → Budget and schedule reserves
- Risk profile
  - → likelihood, impact, trigger symptoms, monitoring methods and response strategy
- Risk schedule | Budget Reserve
  - → time and dollar amount in schedule and budget

#7 Advanced Project Scheduling

* Time-Cost Trade-off → direct cost

Reducing the project duration:

- → Reduce amount of work.
- → Appropriate technology
- → Motivation
- → Support from executives
- → More expensives resources
- → More resources.

- Better resources costs more money [duration is a function of cost]

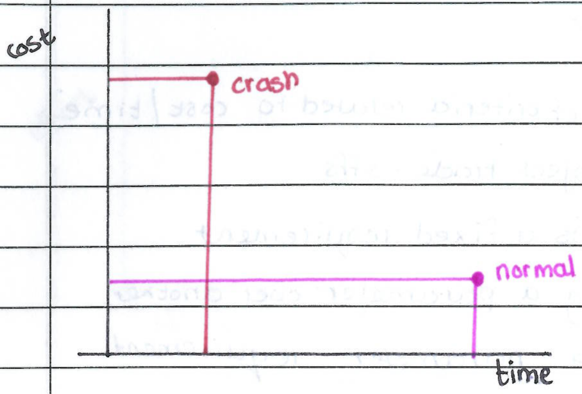
Case where the duration is reduced by more resources

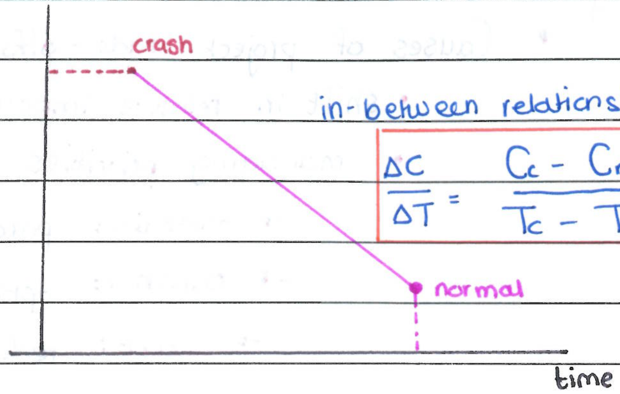
- → More people
- → Overtime
- → Technology
- → Equipment

Normal: work effort considered the norm → least costly

Crash: maximum resources applied → mostl costly

- Normal Time (T_n) and Crash Time (T_c) are fixed
- CPM time cost trade off takes no variability (barring cost) into account
  - → $T = f(\$)$
  - → $T \neq f(\text{Murphy})$





in-between relationship

$$\boxed{\frac{\Delta C}{\Delta T} = \frac{C_c - C_n}{T_c - T_n}.}$$

- ALWAYS reduces the work and adds the resources on Critical Path.
- How far can an activities time be reduced ?
  - → to its crash time
  - → until a parallel path becomes critical.

Principles

1. Choose the least costly slope to shorten the duration
2. Not sufficiently reduced ⟶ second costly slope
3. Look at all non-critical paths
4. if a non-critical path becomes critical — shorten duration

Find the least cost path that allows for the shortest duration. This is achieved by only crashing activities on the critical path

* Method 1: Crash step-by step → Start with lowest cost slope
Method 2: For the shortest duration
→ crash all activities
→ relax activities with the highest cost slope

* Duration with Least Cost

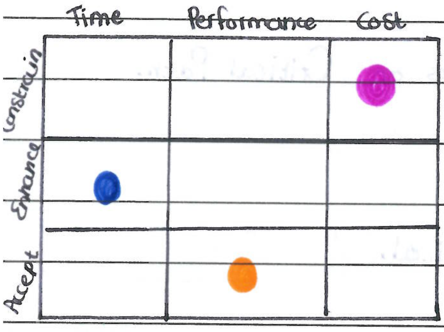
- Objective: complete project in whatever time results in lowest cost
- $\boxed{\text{Total project Cost (TC) = Direct Cost (DC) + Overhead (OH)}}$

Kyk na die voorbeeld in die notes.

Project Priorities:

→ Causes of project trade-offs

- shift in relative importance of criteria related to cost / time
- managing priorities of project trade-offs
    - → constrain : parameter is a fixed requirement
    - → enhance : optimizing a parameter over another
    - → accept : reducing a parameter requirement



Practical Matters

- Good practise to propose two alternatives
- Choice between Plan A or Plan B
- Method 2 is unpractical because if all activities are critical — open up to being late
- Management should decide on acceptable risk / network sensitivity.
- Developing country — longer duration

Theory of Constraints & Critical Chain Method.

Common Problems:

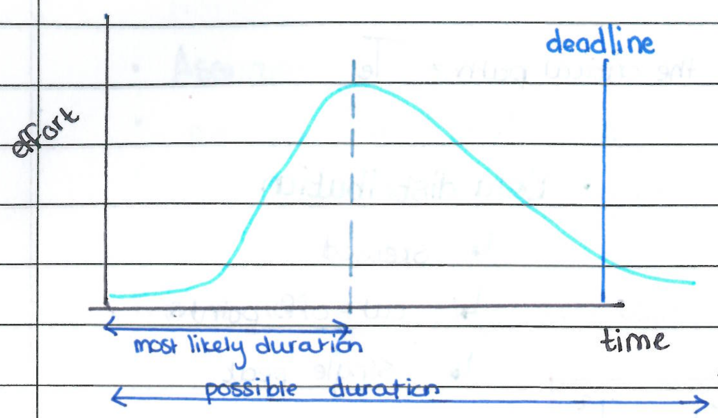
- Meeting all spesification / requirements → budget → time.

Solutions:

- Critical Chain Method: contingency to manage reserves
- Various aspects of the solution have been known from a long time.

Theory of Constraints:

- Critical chain Method is a Theory of Constraints (TOC)
- Duration is considered as the constraint
- Objective is to deliver something that would generate income.
- Sooner the income is materialized the better



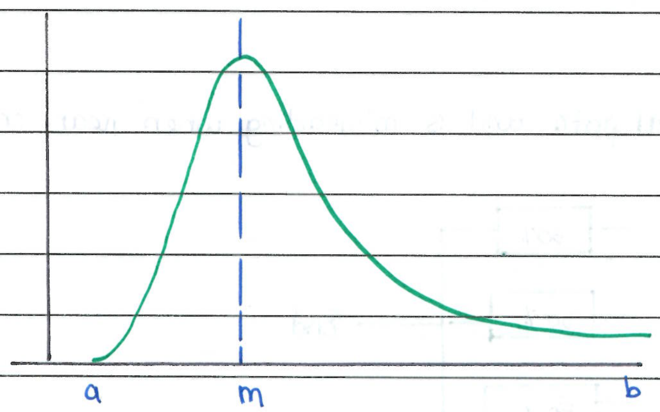
Reserves get wasted:

- We build in a lot of contingency reserve and it gets wasted in:
  - → Student Syndrome
  - → Multi - tasking
  - → Delays accumulate

* PERT technique

P = program
E = evaluation
R = Review
T = Technique

- Adresses variability of the duration of activities on the crictical path
- Treats completion time as probabilistic.
- Deals with uncertainty
- Ex: What is the probability of 20 day completion



a optimistic
b pessimistic < earth quake / strike.
m most likely.

We need to define a cut-off point for b - pessimistic view.

te = expected duration (50% of completion)

$$\boxed{te = \frac{a + 4m + b}{6}}$$

Typo

The sum of te of activities on the critical path = T_e

$$\boxed{T_e = \sum_{cp} t_e}$$

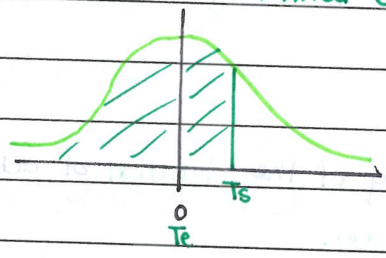
- Beta distribution
  - ↳ skewed
  - ↳ cut-off points
  - ↳ single peak

Standar deviation:

$$\boxed{\sigma = \frac{b-a}{6} \qquad V = \left[\frac{b-a}{6}\right]^2}$$

Steps:

1. Calculate te for each activity
2. Identify the critical path
3. Consider summative distribution of all activities on critical path
   ↳ Normal distribution to find the probability

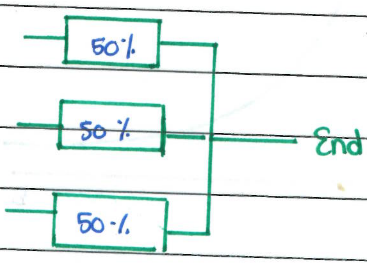


$$Z = \frac{T_s - T_e}{\sigma}$$

4. Compute T_e & σ for the critical path.
5. Use the Z-value to calculate a probability

Shortcomings

- Only considers the critical path and is misleading when near-critical path becomes critical.
- Merge point bias



$0.5^3 = 0.125$ chance of finishing on time.

- Monte Carlo simulation adresses the issue of merge points and near critical paths.
  → randomly select times for project
  → compute the critical path
  → repeat

- Assumes sucessor will start immediately when predecessor is completed
- provides false confidence
- Expecting high probability of Project completion — lets guard down.

Risk of adding up most likely values:

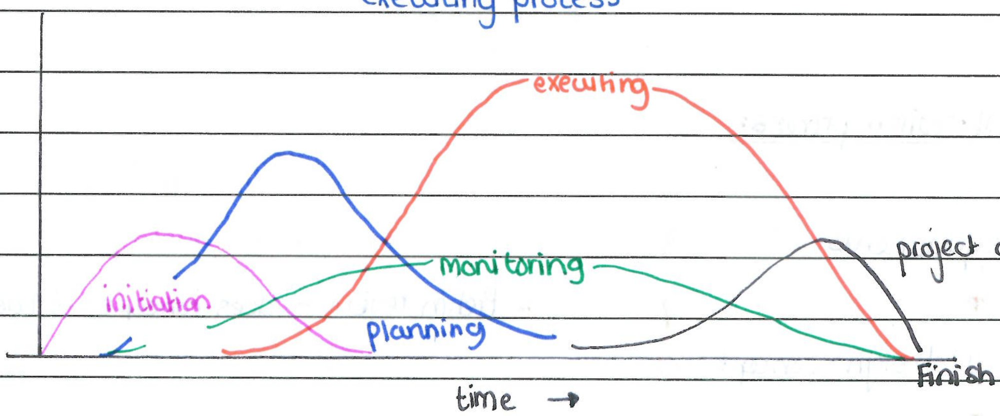
- Simply add up the most likely values
- Does not take into account:
  - non critical paths becoming critical
  - behavioral aspects.
- Add up te and NOT m — skewed distribution.

#11 Project Execution and Control.

Phase C: Project Execution

- Expanding project team
- Assigning responsibilities
- Task integration
- Documentation
- Change Control
- Quality Control
- Inventory Control
- Production Coordination

initiating → planning process ⇄ executing process → Closing process



Design Stage:

PM role:

- Design methodogy
  → functional design
  → Physical design