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SE-054

CLO-02:

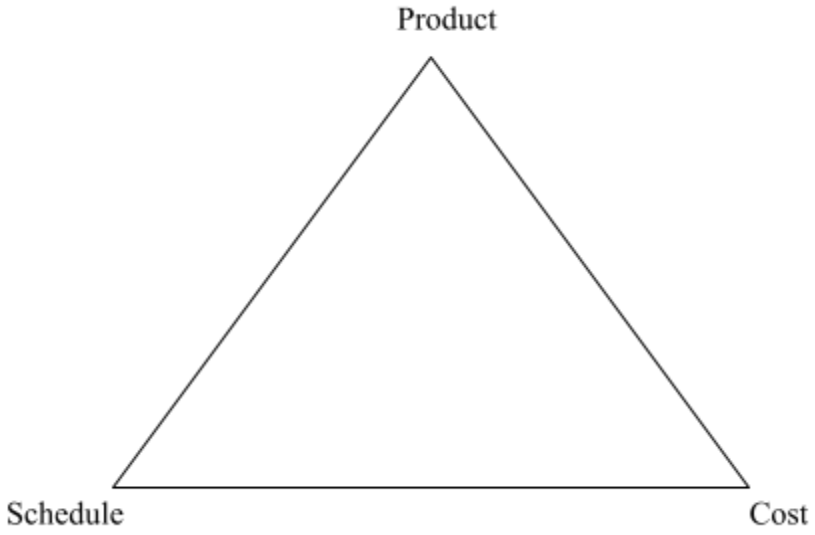
Will develop Skills to manage software Plan, cost, schedule and risk engineering

Q: Explain keeping in view Tradeoff Triangle and Project Management Triangle, how you can manage control of the factors mentioned in CLO above.

TRADE-OFF TRIANGLE:

The tradeoff triangle is a visual representation of the constraints and tradeoff alternatives. It is a way to deal with problems having three/more opposing factors. It has *three dimensions* and a solution will select two out of three factors which will determine the behaviour of the third factor.

In projects, there exists a triangular relationship between project variables i.e: *time (schedule), cost (resources) and product(scope, performance)*. Project managers need to choose two out of three parameters as to whether the product needs to be fast(choose schedule),cheap(choosing cost) or good(focusing on product's quality) since there is never an ideal scenario i.e: three of them can't be achieved at the same time.



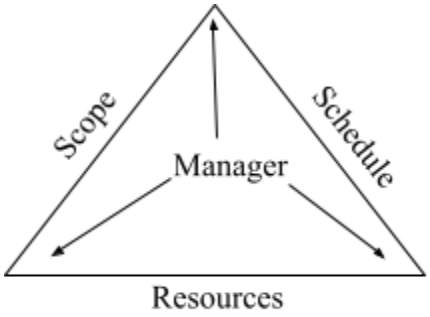
For example: If a client asks for an e-commerce website in a shorter period of time, the project manager must be given some flexibility in terms of scope and cost. So, for a shorter deadline, the manager needs to increase the resources (e.g: manpower),increasing the overall project cost and/or reduce the scope (functionalities) in the final product.

PROJECT MANAGEMENT TRIANGLE:

The Iron Triangle/ Triple Constraint/ Project Management triangle is one of the examples of trade-off triangles that models the relationship among three interdependent project constraints faced by every manager i.e: ***Time(schedule), Cost(resources) and Scope***. This triangle basically

helps the managers in understanding the problems that may arise during a project execution so that the existing constraints don't become a hurdle in successfully completing the project.

It is the duty of the project manager that the plan proposed for project development must adjust to the project management triangle. Usually , the quality of the delivered project is affected by its budget(resources), deadlines(time) and scope(features). Project managers must strike a balance between these key factors so that there is no compromise on the quality of the final product.



Scope: Total work/services to be provided in the final project deliverable. Any change in scope of the project will affect time and cost which needs to be properly managed.

Schedule: Estimated time for delivery of the project. Failure to complete the project within a deadline is usually because of lack of resources and it can adversely affect the project.

Resources: The total resources (cost) required to deliver the project. It includes labor costs, hardware and software costs, vendor payments, etc. Sometimes, additional resources need to be allocated to complete the project on/before time.

There is always a tradeoff between these factors and project managers need to choose any two parameters depending on the client's demand. Note that changes in one constraint must be adjusted by changes in others. *For e.g:* if there is an increase in features(scope), so budget and schedule must be increased accordingly or if we want to complete the project before time, so we need to increase budget or reduce scope.

Strategies to manage plan, cost, time and risk constraints:

In order to manage control of the factors like: schedule,cost, and risks, the project manager must establish parameters on the basis of client's priorities. Software plan must be devised for completing the project while keeping these factors under consideration. Later on, it must be ensured that correct metrics are being tracked to monitor scope, time and cost.

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1. Plan Management:

Software plan refers to selection of appropriate project methodologies to deliver the project within deadline. The project plan is usually affected by change in scope which inturn will impact time,cost and introduce some risks in the project. So in case of scope change, manager must revise the project plan and need to choose between following actions:

- Add time to work with new functionality.
- Add cost by hiring more staff to do extra work.
- Cut quality by eliminating unnecessary requirements.
- Completely monitor things because it may affect other features causing risks.

In order to manage the plan:

- Propose a plan after getting a complete and clear understanding of the scope.
- If any change is requested, there must be a complete procedure for reviewing, approving, or rejecting it, and implementing it.
- Prioritize requirements and ignore unnecessary ones.
- To act according to the plan, discuss scope with stakeholders and coders on a regular basis.

2. Risk Management:

Risk is defined as the probability of occurrence of errors in a project which have a huge impact on its success. These are the constraints which can be reduced but can never be permanently removed. In the early phases of project planning, Risk Engineering assists in identifying and preventing defects from being incorporated in the project. The project management triangle evaluates all of a project's risks and manages them by modifying the other constraints in a project:

- Extending the deadlines for a project decreases the risks of late deliveries, and stops the project from failing altogether.
- Where a small budget poses a threat to the project, the project's cost should be tailored and agreed with the customer accordingly. Some part of the budget should also be allocated for risk management such as to fulfill new feature requests by the client or to complete the project before the expected time.
- Risk engineering should also be used to deal with the scope challenge in a project.

3. Fixed Cost:

If the client has a fixed budget but he gives flexibility in time and scope, so only the business critical modifications requests are expected to be accepted. In this case, a manager will consider adjusting the deadlines, cutting off the scope or settling on lower quality.

- Work in strict accordance with the clients priority.

- Release in short sprints of 1-2 week and access risk in each sprint.
- Track velocity and burn rate.
- Use some resource management tool which provides information on the staff's capacity, resource consumption, and performance in order to explain the project's cost estimates to your clients.

4. Fixed Time:

If the client is more strict in terms of deadline, then cost and scope are expected to be versatile. In order to complete the project by the due date, more resources might be required (increased cost) or scope/ quality of the final product might need to be cut off. In such a case, a manager should:

- Choose right tools for tracking time.
- Monitor team hours to ensure that they're working as per schedule.
- Use previous project records to come up with accurate estimates of time.
- Hire more developers ,if needed.
- Set sprint and iteration durations.
- Ensure risk assessments for each sprint.

5. Fixed Scope:

The client may need to request more features during the project as per the customers requirements.If scope matters most to the client, then manager must be flexible in terms of time and cost i.e: timings may need to be adjusted or we may need to increase the cost/resources in case of scope change. In this case:

- Prepare a comprehensive Statement of Work document that outlines the overall scope of the project as well as basic deliverables, standards, criteria, and specifications for each process.
- During sprint 0, emphasize on backlog description for defining the scope accurately.
- Focus on the product's quality and verify scope.
- Keep a track of defects and errors for scope accuracy.

6. Fixed Cost and Scope:

In case where the client requests a fixed price for a fixed number of deliverables; compromise on delivery date, if needed. Moreover, each sprint must also be validated.

7. Fixed Time and Scope:

The total cost of the project needs to be adjusted when customers want specific functionalities within specific time. In such a case, hire additional staff , if needed. Also, when each module of a sprint is completed, verify it.

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8. Fixed Cost and Time:

If the clients can't compromise on budget and schedule of the project, the features to be delivered (scope) is flexible. In this case, a manager must prioritize the client's requirements and cut off unnecessary features, if required.

9. Fixed Scope, Cost and Time:

When the client doesn't allow for any compromise in the project, then the project manager should negotiate with the team whether they are ok in working for such a project. Moreover, he must select a process that is feasible with a waterfall method.

Conclusion:

The project management triangle is a useful tool to reason about projects priorities and trade-offs among the projects constraints at a higher level.