Homework #1

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SEG4105 - Software Project Management

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University of Ottawa

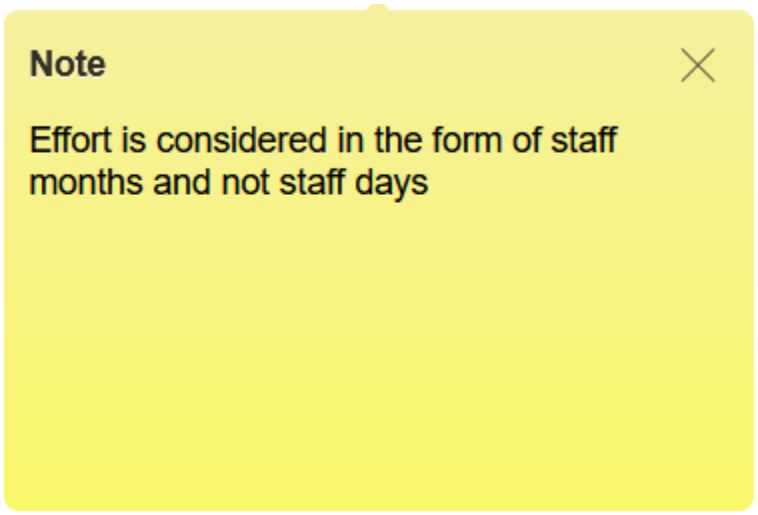
Q1 (5 marks)

If I were a project manager at Madeup Inc, I would choose the Delphi method for the Incremental and Iterative Development Process.[1] This method allows me to choose the smallest estimate among the three options (4000 LOC < 5000 LOC < 6000 LOC) for each software component. This is the optimal method since it makes the development cycles more manageable, the integration easier, and the testing and debugging more efficient. Therefore, this approach can improve the quality of the software. However, I am also ready to change my decision if the actual size of the software component changes during the project.

[1] Bunardzic, A. (2023, February 8). Incremental and Iterative Development - Alex Bunardzic - Medium. *Medium*. https://medium.com/@alexbunardzic/incremental-and-iterative-development-8a55ffcf4145

Q2 (5 marks)

FEEDBACK TO ADDRESS



We use the COCOMO 1 formula[2] for the effort/staff-months:

```
e = a*(size)^b
```

Where:

```
e = effort

a = 3.0 (constant in semi-detached mode)

b = 1.12 (constant in semi-detached mode)

size = size of the software product
```

We know that e = 250 staff-months so we can calculate the size of the software product like so:

```
size = (e/a)^(1/b)
```

[2] GeeksforGeeks. (2023, June 9). *Software Engineering COCOMO Model*. https://www.geeksforgeeks.org/software-engineering-cocomo-model/

When we substitute the values, we get:

```
size = (250/3.0)^(1/1.12)
```

We use the COCOMO 1 formula[3] for the duration:

```
duration = c*(e)^d
```

Where:

```
c = 2.5 (constant in semi-detached mode)

d = 0.35 (constant in semi-detached mode)
```

Assuming there are enough resources available, when we substitute the values, we get:

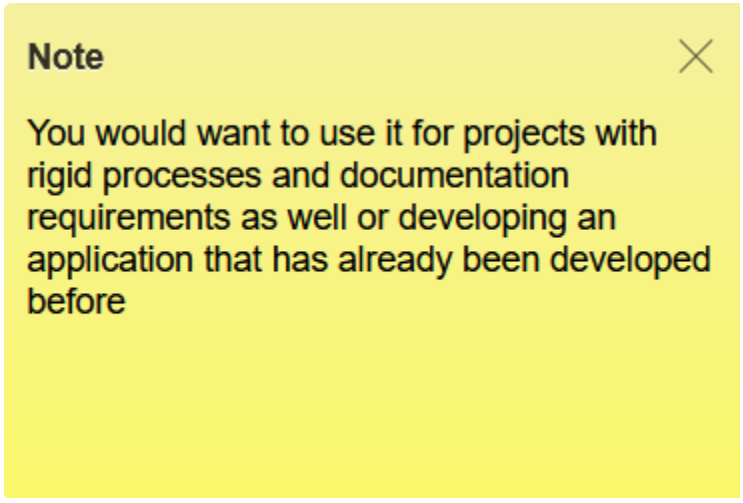
```
duration = 2.5*(250)^0.35
```

Thus, the projected duration for completing the software development is 17.267084396 months, or **18 months** when rounded up.

[3] GeeksforGeeks. (2023, June 9). *Software Engineering COCOMO Model*. https://www.geeksforgeeks.org/software-engineering-cocomo-model/

Q3 (5 marks)

FEEDBACK TO ADDRESS



A Waterfall life cycle can be beneficial when there is a project with rigid processes and documentation requirements or when developing an application that has already been developed previously. In this case, the following statements below can be true.

1. The requirements are clear and fixed
2. The final product is clear and fixed
3. Tech stack in the project is tried-and-tested
4. There is no room for significant changes once the project has started
5. The development team has the necessary skills and resources at their disposal from the start of the project
6. It is a short project

Q4 (5 marks)

Part A

According to Brook's Law, under certain conditions, adding more people can slow down a project.[4] Firstly, there might not be enough training time for new team members–this will slow down the project since they need time to understand the project. Secondly, if there are too many people, it can lead to communication overhead such that too much time is spent in meetings and not on actual development. Lastly, the sequences of tasks/critical path might require a set amount of time. For example, if we want to build a wall (task A), plaster it (task B), and then paint it (task C), task C can't start until task B is done, and task B can't start until task A is done. Therefore, even if we assign 1 task per worker, it will not reduce the project duration to ⅓ of its expected time. This is because there is a sequence that must be followed.

Part B

According to Brook's Law, under certain conditions, adding more people can slow down a project.[5] Firstly, adding new team members to a project requires additional onboarding time which will take time away from those already working on the project. Secondly, increasing the size of the team makes it harder to keep everyone on the same page, and misunderstandings can lead to mistakes and delays. Lastly, there might not be enough tasks that can be done simultaneously–some tasks depend on others being completed first.

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[4] Fuqua, A. (2021, October 31). *The Law of Constraints and Brooks' Law*. LeadingAgile. https://www.leadingagile.com/2014/01/theory-constraints-brooks-law/

[5] Fuqua, A. (2021, October 31). *The Law of Constraints and Brooks' Law*. LeadingAgile. https://www.leadingagile.com/2014/01/theory-constraints-brooks-law/

Q5 (5 marks)

Even though we know that changes are likely to happen, planning is still an essential part of software projects. Firstly, gathering requirements and creating a WBS provide a clear direction for the project. Secondly, estimation helps in understanding the amount of work involved and the resources needed. Thirdly, planning helps in preparing for potential risks and issues that might come up during the project. Lastly, having a plan makes it easier to manage changes and adjust as needed.

We can use a use-case to explore this concept. Let's say we are creating a mobile banking app. First, the bank needs a clear idea of what features they want in the app (direction). Based on those features, the project manager estimates how much work will be involved and what resources need to be allocated (estimation). Then, the project manager plans for risks and issues (preperation). Lastly, as the project progresses, the project manager can a new plan if the bank wants to add new features/change the existing features.

Q6 (5 marks)

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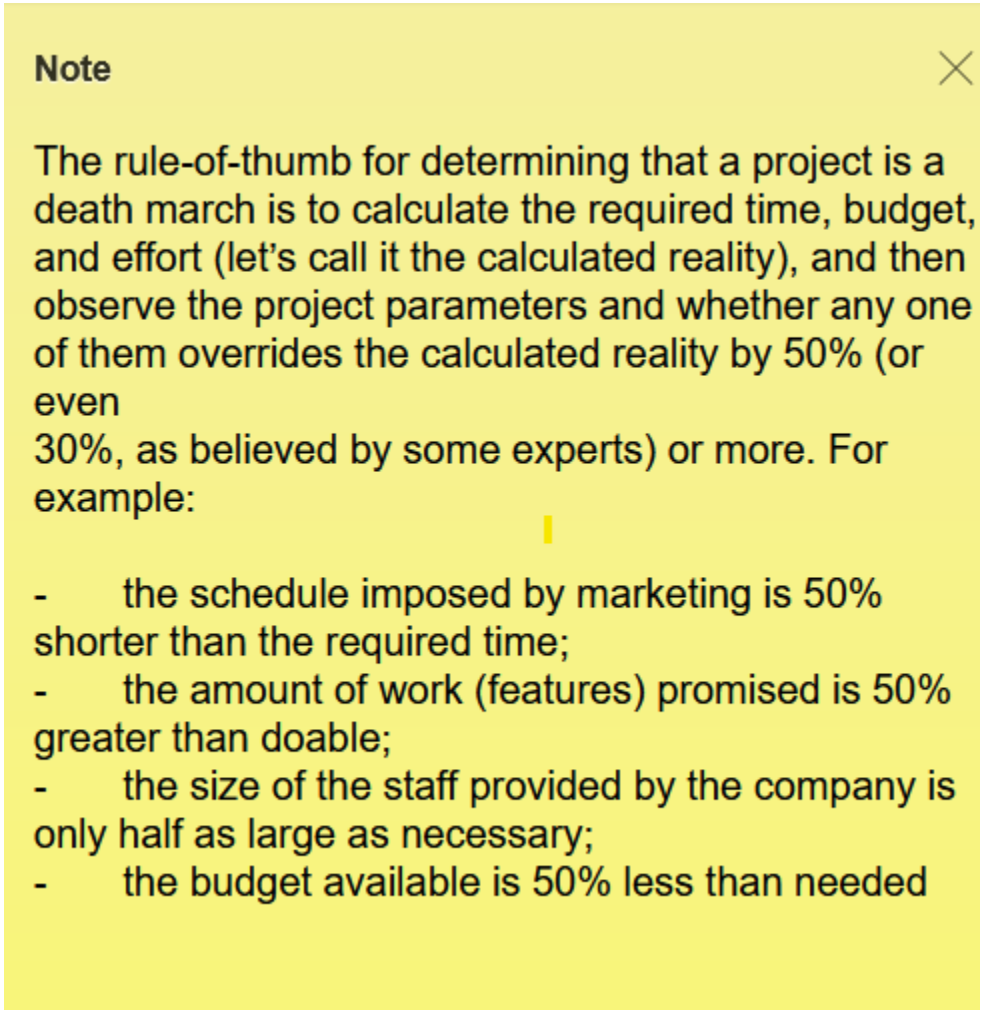


A death march is a project where the members feel it is destined to fail, or requires a stretch of unsustainable overwork. The general feel of the project reflects that of an actual death march because the members of the project are forced to continue the project by their superiors against their better judgment. A rule-of-thumb for determining if a project is a death march is if the project's deadlines, resources, or scope are extremely constrained.[6] The rule-of-thumb for

[6] Glasser, E. (2018, October 3). What is Developer Death March? - Developer Death March - Medium. *Medium*. https://medium.com/developer-death-march/what-is-developer-death-march-1d16a45d12d4

determining that a project is a death march is to calculate the required time, budget, and effort. We then observe the project parameters to see if any one of them overrides the calculated effort by more than 30% (standard is 50% more, but 30% is pretty bad).

Examples of reasons why this could occur are the following.

1. The schedule imposed by marketing is 50% shorter than the required time;
2. The amount of work promised is 50% greater than doable;
3. The size of the staff provided by the company is half as large as necessary;
4. The budget available is 50% less than needed.

Q7 (5 marks)

We know that:

```
CAF is 0.65 + 0.01*N.
```

Where:

```
N  = weighted sum of all the 14 environmental factors
```

Since each factor can have a value between [0, 5], the maximum value of N can be 5*14=70.

Let's substitute N = 70 (maximum value). We get:

```
CAF = 0.65 + 0.01*70 = 1.35
```

This means that at maximum, the CAF can increase your estimate by 35%.

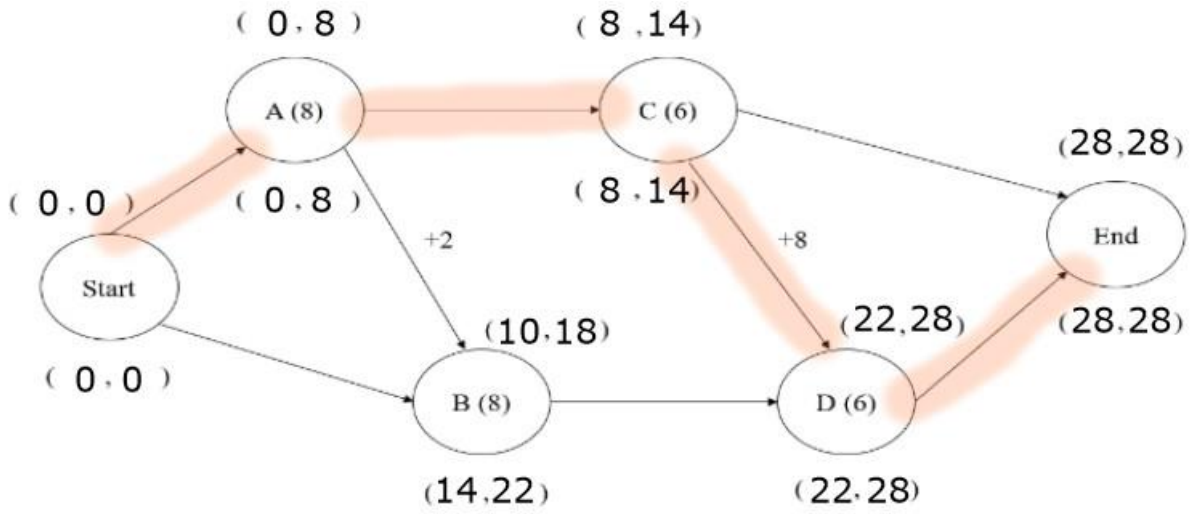
Let's substitue N = 0 (minimum value). We get:

```
CAF = 0.65 + 0.01*0 = 0.65
```

This means that at minimum, the CAF can decrease your estimate to 65%. This is a reduction of 35%.[7]

[7] *Estimation Techniques - FP counting process*. (n.d.). https://www.tutorialspoint.com/estimation_techniques/estimation_techniques_fp_counting_process.htm

Q8 (5 marks)



The Critical Path is Start–A–C–D-End.

Bibliography

1. Bunardzic, A. (2023, February 8). Incremental and Iterative Development - Alex Bunardzic - Medium. *Medium*. https://medium.com/@alexbunardzic/incremental-and-iterative-development-8a55ffcf4145
2. GeeksforGeeks. (2023, June 9). *Software Engineering COCOMO Model*. https://www.geeksforgeeks.org/software-engineering-cocomo-model/
3. Fuqua, A. (2021, October 31). *The Law of Constraints and Brooks' Law*. LeadingAgile. https://www.leadingagile.com/2014/01/theory-constraints-brooks-law/
4. Glasser, E. (2018, October 3). What is Developer Death March? - Developer Death March - Medium. *Medium*. https://medium.com/developer-death-march/what-is-developer-death-march-1d16a45d12d4
5. *Estimation Techniques - FP counting process*. (n.d.). https://www.tutorialspoint.com/estimation_techniques/estimation_techniques_fp_counting_process.htm