**ASSIGNMENT:2**

**COURSE:SOFTWARE PROJECT MANAGEMENT**

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**STEP 1:**

**SELECTING THE COCOMO MODEL**

Based on the project specifications it will be best to use the intermediate COCOMO model type.

**JUSTIFICATION:**

1. the project has a strict deadline .
2. The project is of medium complexity.
3. Analysis is needed on all cost drivers.

**STEP 2:**

**PROJECT TYPE SELECTION**

Based on project specifications the most suitable type will be (Semi-Detached Project).

**JUSTIFICATION:**

1. Given 100k lines of codes(semi detached projects support 50 - 300 KLOC).
2. Mixed level of team experience:Semi -Detached Processes are best for Mixed level of Team experience
3. Semi-detached project is ideal for this type of reliability and performance.

**STEP 3:**

**EFFORT ESTIMATION:**

The formula for effort estimation in intermediate COCOMO model is as follows:

E = a \* (KLOC)^b \* EAF

E is effort Applied in Person- Months.

KLOC is the estimated size of the software product estimated in kilo lines of codes.

EAF is a multiplier used to refine effort estimate obtained from the basic COCOMO model.EAF is calculated by analyzing cost drivers giving them rating according to the project and adding them up.

a=3.0

b=1.12

EAF= 0.8146

Effort =3.0 \*(100)^1.12\*0.8146

The calculated effort is approximately **424.68 person-months**.

**STEP 4:**

**COST DRIVER ANALYSIS**

| **Cost Driver** | **Rating** |
| --- | --- |
| **Required Software Reliability Extent** | 1.30 |
| **Size of the Application Database** | 1.00 |
| **Complexity of the Product** | 1.30 |
| **Run-time Performance Constraints** | 1.15 |
| **Memory Constraints** | 0.85 |
| **Platform Volatility** | 0.85 |
| **Personnel Capability** | 1.00 |
| **Personnel Experience** | 1.00 |
| **Use of Software Tools** | 1.00 |
| **Multi site Development** | 0.75 |
| **Required Development Schedule** | 1.30 |
| **Application Experience** | 1.00 |
| **Use of Commercial Off-The-Shelf (COTS)** | 0.70 |
| **Development Environment** | 0.85 |
| **EAF** | 0.8146 |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  |  | | --- | --- | --- | | **Rating level** | **range** | **Description** | | **Very low** | **0.70** | **Minimal impact** | | **low** | **0.85** | **Slight impact** | | **nominal** | **1.00** | **neutral** | | **high** | **1.15** | **Slightly increase effort** | | **Very high** | **1.30** | **Significant increase effort** | |

**STEP 5**

**STAFFING AND SCHEDULE CONSTRAINT**

TDEV = c \* (Effort)^d \* EAF

TDEV=2.5×(425)0.35×0.8146

TDEV = 40.35 months

DESIRED TDEV=18 months

New Effort=Effort×(Desired TDEV/Original TDEV)^k

k is typically between 1.5 and 2 for software projects.

Let's assume k=1.5 for this scenario.

NEW EFFORT=1425 person months.

Team size=New effort/Time

Team size=1425/18 = 80 people.

**Proposed Staffing Plan**

Given the impracticality of scaling up to 80 people, we can consider alternative strategies:

**Phased Approach:**

Break the project into smaller, independent phases that can be completed sequentially or in parallel, reducing the need for a massive team.

**Outsourcing and Contract Work:**

Hire external contractors or outsource specific parts of the project (e.g., testing, UI design) to reduce the workload on the internal team.

**Agile Methodology:**

Use Agile practices to improve efficiency, prioritize high-impact features, and allow for continuous delivery.

This way, the core team can focus on critical components while less critical tasks can be deferred.

**Additional Tools and Automation:**

Invest in tools that automate repetitive tasks, such as CI/CD pipelines, automated testing, and project management software, to reduce the overall effort required.

**COST CALCULATION**

**Effort = 425 person-months**

**Average monthly cost per developer = $9,000**

Total Cost=Effort×Average Monthly Cost per Developer

Total Cost=425×9,000=$3,825,000

**STEP 7:**

**RISK ASSESSMENT:**

| **Risk** | **Impact on Project** | **Mitigation Strategy** |
| --- | --- | --- |
| Inaccurate Size Estimation (KSLOC) | Cost overruns, delays, or resource waste | Use multiple estimation techniques and historical data |
| Incorrect Cost Driver Ratings | Inflated or insufficient effort estimates | Review with experts, adjust ratings as needed, use ranges |
| Changes in Project Scope/Requirements | Scope creep, increased cost, reduced quality | Implement change management, maintain buffers, use agile |

**STEP 8:**

**CRITICAL ANALYSIS AND RECOMMENDATIONS**

| **Area** | **Analysis** | **Recommendation** | **Impact** |
| --- | --- | --- | --- |
| **Effort Estimate** | **425 person-months** effort needed. | - **Reduce scope** (MVP). | - **Reduces cost** and timeline. |
| **Cost Estimate** | **$3.82 million** cost, exceeding budget by **$1.820,000**. | - **Phased development**.  - **Optimize team size**. | - **Meets budget** by spreading cost across phases. |
| **Timeline (TDEV)** | Estimated at 40 **months**, too long. | - Use **Agile** for faster cycles.  - **Adjust team size**. | - **Shortens timeline** and improves flexibility. |
| **Scope and Changes** | Scope creep could cause overruns. | - Implement **change management**.  - Maintain **buffers**. | - Manages scope and reduces risk of overruns. |
| **Cost Driver Accuracy** | Inaccurate ratings affect effort and cost. | - **Reassess cost drivers** regularly. | - **Improves accuracy** and reduces errors. |
| **Team Size Optimization** | Large teams may increase overhead. | - **Balance team size** with senior/junior mix. | - Optimizes costs and boosts productivity. |
| **Phased Delivery** | Large scope makes full delivery challenging. | - Break project into **phases**. | - **Faster delivery** of core features. |
| **Alternative Estimations** | COCOMO may be inaccurate. | - Cross-check with **alternative methods**. | - **Improves accuracy** of estimates. |