# Assignment 2

Course: Software Project Management

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## Step 1: Selecting the COCOMO Model

The Intermediate COCOMO model has been chosen as the most suitable for this project.

### Justification:

- The project has a strict deadline.  
- The complexity of the project is moderate.  
- A detailed analysis of cost drivers is required.

## Step 2: Project Type Selection

The project falls under the Semi-Detached Project category based on its specifications.

### Justification:

- The estimated size of the project is 100 KLOC, fitting within the semi-detached range (50-300 KLOC).  
- The team has a mixed level of experience, which is best suited to semi-detached projects.  
- Reliability and performance requirements align with semi-detached characteristics.

## Step 3: Effort Estimation

The effort required was calculated using the formula for the Intermediate COCOMO model:  
Effort (E) = a × (KLOC)^b × EAF

Parameters:  
- a = 3.0  
- b = 1.12  
- KLOC = 100  
- EAF = 0.8146

Effort = 3.0 × (100)^1.12 × 0.8146 ≈ 424.68 person-months.

## Step 4: Cost Driver Analysis

An analysis of cost drivers was conducted to refine the effort estimation. The ratings are as follows:

|  |  |
| --- | --- |
| 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 |

Effective Effort Adjustment Factor (EAF) = 0.8146.

## Step 5: Staffing and Schedule Constraints

The time to develop (TDEV) was calculated as:  
TDEV = c × (Effort)^d × EAF  
Where:  
- c = 2.5  
- d = 0.35

TDEV = 2.5 × (425)^0.35 × 0.8146 ≈ 40.35 months.

Given the desired development time of 18 months, the following adjustments were made:  
- New Effort = Effort × (Desired TDEV / Original TDEV)^k  
Assuming k = 1.5, the new effort is 1425 person-months.

To meet the timeline, a team of 80 members would be required (1425 / 18).

### Proposed Staffing Plan:

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

**Phased Approach** Divide the project into smaller phases.  
**Outsourcing and Contract Work** Delegate specific tasks externally.  
**Agile Methodology** Prioritize high-impact features and ensure continuous delivery.  
**Additional Tools and Automation** Employ tools to streamline tasks and improve efficiency.

## Step 6: Cost Calculation

The estimated cost is calculated as follows:  
Effort = 425 person-months  
Average monthly cost per developer = $9,000  
Total Cost = 425 × 9,000 = $3,825,000.

## Step 7: Risk Assessment

The identified risks and their mitigation strategies are as follows:

|  |  |  |
| --- | --- | --- |
| 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

Key areas analyzed and corresponding recommendations are detailed below:

|  |  |  |  |
| --- | --- | --- | --- |
| Area | Analysis | Recommendation |  |
| Effort Estimate | 425 person-months required. | Reduce scope (MVP). |  |
| Cost Estimate | $3.82 million exceeds budget by $1.82 million. | Implement phased development, optimize team size. |  |
| Timeline (TDEV) | 40 months is too long. | Use Agile practices for faster delivery. |  |
| Scope and Changes | Scope creep risks overruns. | Apply strict change management. |  |
| Cost Driver Accuracy | Inaccurate ratings impact effort and cost. | Reassess cost drivers regularly. |  |
| Team Size Optimization | Large teams increase overhead. | Balance senior and junior team members for efficiency. |  |
| Phased Delivery | Full delivery challenging due to scope. | Deliver in smaller phases for faster results. |  |