Assignment 4

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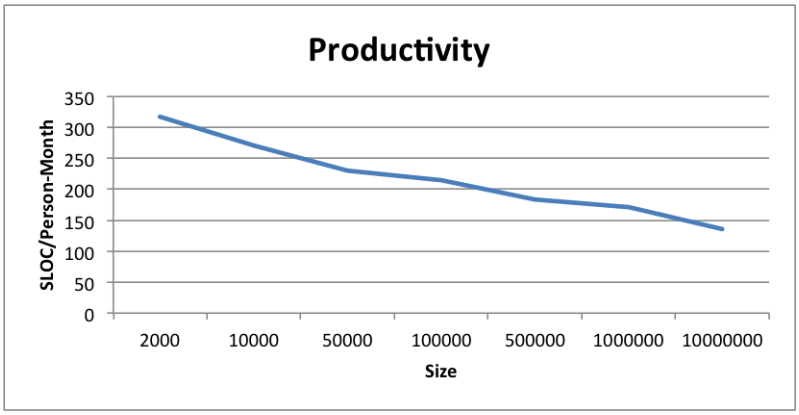
November 21, 2011

1. Using the COSYSMO model on the spreadsheet `academicCOSYSMO_2.0.xls` and selecting an arbitrary baseline of 100 nominal requirements I determine the most cost effective approach to be Option 3: Product Line Approach.

Option	**Cost**
Option 1	33.4 person-months
Option 2	36.3 person-months
Option 3	18.9 person-months

   Option 1 is calculates as 100 New System Requirements. **Option 2** is calculated as 50 Deleted System Requirements, 50 New System Requirements, and 50 Modified System Requirements. **Option 3** is calculated as 25 Designed for Reuse System Requirements, 25 Modified System Requirements, and 50 Managed System Requirements.

2. The phenomenon related to scale that is represented in the results is a dis-economy of scale. As the size of the project increases, the productivity goes down. Since *scale* is an exponent in the COCOMO formula, this is a non-linear relationship and tends to look logarithmic. See the accompanying spreadsheet for the raw graph data. Calculations were performed using the USC COCOMO II tool.



3. To estimate this I use the COCMO II model and assume a baseline of 100,000 new SLOC which yields an effort of 465.3 person-months with all Scale and Cost Drivers set to *Nominal*.

The schedule change represents a 75% (Very Low) value for the Required Development Schedule (SCED) Software Cost Driver and results in an effort of 665.4 person-months. This is an increase of 200.1 person-months, almost a 43% increase in effort.

4. To estimate this I use the COCMO II model and assume a baseline of 100,000 new SLOC which yields an effort of 465.3 person-months with all Scale and Cost Drivers set to *Nominal*.

   Changing the Application Experience Software Cost Driver from *Nominal* to *Low* is representative of 6 months experience and increases the effort to 511.8 person-months. Changing Application Experience to *High* is representative of 3 years experience and reduces the effort to 409.5 person-months, a change in effort of 102.3 person-months.

   Similarly, changing the Language and Toolset Software Cost Driver from *Nominal* to *Low*, representing a 6 month experience level, increases the effort from the baseline of 465.3 to 507.2 person-months. Changing Language and Toolset to *High*, representing a 3 year experience level, reduces the effort to 423.4 person-months, a change in effort of 83.8 person-months.

5. Using the USC COCOMO II model I determine the cost of custom development to be $521,805 for elaboration and construction. Even adding an additional $93,925 for Inception and Transition still brings the total to $615,730, $134,270 below the vendor's price.

   In determining the cost I used the following values that were based on the lectures from the past two weeks.

Cost Driver	**Cost Driver Value**	**Model Value**
Programmer Capability	75^{th} percentile	High
Analyst Capability	75^{th} percentile	High
Personnel Continuity	stable staff with 3% annual turnover	Very High
Multi-site Development	entire team is co-located together	Extra High
Use of Software Tools	strong toolset, moderately integrated	High
Required Development Schedule	85% of the nominal schedule	Low

   All other values were literally supplied.