IT314 Software Engineering Team 7

Cost Estimation Document

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1.0	Abhishek, Sonu	Cost Estimation	Surabhi	31 March, 2013

Brief Description of the cost estimation method used:

Use case modelling is an accepted and widespread technique to capture the business processes and requirements of a software application. Since they provide the functional scope of the application, analyzing their contents provides valuable insight into the effort and size needed to design and implement the application. In general, applications with large, complicated use cases take more effort to design and implement than small applications with less complicated use cases. Moreover, the time to complete the application is affected by:

- The number of steps to complete the use case.
- The number and complexity of the actors.
- The technical requirements of the use case such as concurrency, security and performance.
- Various environmental factors such as the development teams' experience and knowledge.

Use Case Points (UCP) is an estimation method that provides the ability to estimate an application's size and effort from its use cases.

The equation is composed of five variables:

1. Technical Complexity Factor (TCF).
2. Environment Complexity Factor (ECF).
3. Unadjusted Actor Weight (UAW).
4. Unadjusted Use Case Weight (UUCW).
5. Productivity Factor (PF).

Each variable is defined and computed separately, using perceived values and various constants. The complete equation is:

UCP = (UUCW + UAW) x TCF x ECF
UCP = UCP * PF

The necessary steps to generate the estimate based on the UCP method are:

1. Determine and compute the Technical Factors.
2. Determine and compute the Environmental Factors.
3. Compute the Unadjusted Use Case Points.
4. Determine the Productivity Factor.
5. Compute the product of the variables.

Unadjusted Use case Points (UUCP):

Unadjusted Use Case Weight (UUCW)**:**

Unadjusted Use Case Points		Multiplier	Number of Use Cases	Description
1	Simple	5	3	Simple Use Case - up to 3 transactions.
2	Average	10	4	Average Use Case - 4 to 7 transactions.
3	Complex	15	0	Complex Use Case - more than 7 transactions.
Calculated UUCW			55	

UUCW = (Total No. of Simple Use Cases x 5) + (Total No. Average Use Case x 10) + (Total No. Complex Use Cases x 15)

Individual Use Cases		Multiplier	Use Case Name
1	Simple	5	Login
			Registration
			Site Maintance
2	Average	10	Manage Taxonomies
			Profile Maintance
			Create Articles and Bulletins
			Commenting
3	Complex	15	None

Unadjusted Actor Weight (UAW)**:**

Actor Summary		Multiplier	Number of Actors	Description
1	Simple	1	1	Simple actors are other systems that communicate with your software through Application Programming Interface.
2	Average	2	4	Average actors can either be human beings interacting in a well-defined protocol.
3	Complex	3	1	The original definition of complex actors specifies that users who interact with the software through a graphical user interface are complex actors. While that is true, the same classification should apply to users who interact with the system in unpredictable ways.
Calculated UAW			12	

UAW = (Total No. of Simple actors x 1) + (Total No. Average actors x 2) + (Total No. Complex actors x 3)

Individual Actors		Multiplier	Actor Name
1	Simple	1	Database
2	Average	2	Contributor, Subscriber, Author, Editor
3	Complex	3	Administrator

Technical Complexity Factor (TCF)

Description	**Weight**	**Relevance (0-5)**	**Calculated Factor (Weight*Relevance)**
Distributed System	2	1	2
Performance	1	3	3
End User Efficiency	1	2	2
Complex Internal processing	1	1	1
Reusability	1	2	2
Easy to Install	0.5	1	0.5
Easy to use	0.5	2	1
Portable	2	2	4
Easy to change	1	2	2
Concurrent	1	1	1
Special Security features	1	2	2
Provides Direct access for third parties	1	2	2
Special user training facilities are required	1	0	0
Total Factor (TF)		22.5	

TCF = 0.6 + (TF/100) = 0.6 + 0.225 = 0.825

Environmental Complexity Factor (ECF)

Description	**Weight**	**Past Experience (0-5)**	**Calculated Factor (Weight* Past Experience)**
Familiarity with development process used	1.5	2	3
Application Experience	0.5	3	1.5
Object Oriented Experience	1	1	1

Lead analyst capability	0.5	3	1.5
Motivation	1	4	4
Stable Requirements	2	4	8
Part-time workers	-1	0	0
Difficult Programming language	-1	1	-1
Total Factor (EF)		18	

ECF = 1.4 + (-0.03 x EF) = 1.4 – 0.54 = 0.86

UCP = (UUCW + UAW) x TCF x ECF

= (55+12) x 0.825 x 0.86

=47.53

Productivity Factor (PF)

It is the number of hours per Use Case Point (UCP).
The “complex projects” have a higher PF (28 to 1) than “simpler projects” (20 to 1). The following calculation determines if a project is complex:
For each of the following environmental factors that have a value below 3, add a point.

- 1. Familiarity with the project.
- 2. Application experience.
- 3. Object oriented programming experience.
- 4. Lead analyst capability.
- 5. Motivation.
- 6. Stable requirements.

For each of the remaining environmental factors that have a value above 3, add a point.

- 7. Part time staff.
- 8. Difficult programming language.

Add up the points. If you have fewer than 3 points, use 20 hrs per UCP. If you have 3 or 4 points, use 28 hrs per UCP. If you have 5 or more points, restructure the project.

We have 2 points, suggesting our project to be simple.
So, PF = 20

Estimated Effort = UCP x PF

=47.53*20

=950.73