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How to Prepare Quotation Using Use Case Points

Posted by Shivprasad Koirala on Sunday, December 26, 2004 (EST)

Quotation is one of the important aspect of software cycle. Any prediction less or more will affect the project a lot.In this article we will basically go through use case point theory and then take up practical example of a Use Case and prepare quotation according to it.

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Introduction0" />

Introduction

"You can not plan if you can not measure AND IF YOU FAIL PLAN YOU HAVE PLANED TO FAIL."

Quotation :- Its a financial document send from supplier to customer regarding service to be provided. Its also called as temporary financial document for negotiations." A statement of price, terms of sale, and description of goods or services offered by a supplier to a prospective purchaser, a bid. When given in response to an inquiry, a quotation often is considered an offer to sell."
Definition Reference from [http://elmo.shore.ctc.edu/jbaker/glossery.htm [^]].

Quotation is one of the important aspect of software cycle. Any prediction less or more will affect the project a lot. Lets look at how basically day to day business manage there way of handling quotations.

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“Mr. Harry gets a contract of delivering 10 tons of steel from place “X” to place “Y”.He has 2 trucks each can carry 5 tons each. Place “X” and place “Y” are 1 KM(Kilometer) apart.”

So here’s Harry’s calculations on experience basis ,one truck if delivers 5 tons for 1 KM is 500$.So on 2 truck it is 1000$.So the quotation is 1000$.Just wondering can we do that with software industry. There are 100 modules company has 5 programmers every programmer can complete 20 modules in 3 months. Every programmer salary is 1000$ so 5 X 1000 X 3 = 15000$.The truck quotation calculation is more confident than software quotation why? .
In trucks quotation harry had followed the following process :

- Harry had measurement of his work: 10 tons to be delivered.1 KM to be traveled
- Harry knew what effort will be required: 5 tons/per truck/per km
- So the quotation:1000$.

So basically Harry had measurement of his work. He knew the volume of what he has to deliver, that’s the problem with software industry. As software industry output is more in to logical output its difficult to measure linearly the effort required to complete a project and hence the quotation. Software industry is struggling for past 40 years to come to standard of measurement and that’s where all the mess is. Many ideas and measurement methodology has been proposed by researchers. Each have there own advantages and disadvantages.Heres some of the measurement methodology

- McCabe’s Measurement of complexity
- Henry and kafura’s Information Flow.
- Halstead measurement of complexity
- Lines of Code (LOC)
- Function Points (My old tutorial on function points http://www.geocities.com/shiv_koirala/fp/fp.html [^])
- Use Case Points.

Do not be tensed by some unheard technology described above, its only provided for knowledge base. Links are provided for McCabe's complexity, Henry and kafura's information flow, Halstead measurement complexity and LOC. I have just mentioned them as they are old measurement technologies. If any one want to explore it see my references section. This tutorial will look in to Use Case Points methodology and looks in to its advantages and disadvantages. So in this article we will basically go through use case point theory and then take up practical example of a Use Case and prepare quotation according to it.

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AcronymsandAbbreviation:0" />

Acronyms and Abbreviation:

Note: Have these acronyms in hand always as they are used through out the tutorial. Do not be tensed by the acronyms below they are for reference sake and as you proceed ahead with the tutorial you will have more clear picture what exactly they are.

Table 1.0

Acronym	**Full form**	**Definition**
UCP	Use case point	Use Case points method is a software sizing and estimation based on Use case document.
UAW	Unadjusted actor weights	A numeric sum of value of actors after giving the classification and before multiplying the technical complexity factor of the system. (When you go through steps of how to calculate UAW this will be more clear)
UUCW	Unadjusted Use case Weight	A numeric sum of value of Use cases after classifying and before multiplying the technical complexity factor of the system. (When you go through steps of how to calculate UUCW this will be more clear)
UUCP	Unadjusted Use Case Points	Sum of UAW and UUCW
API	Application program interface	Application programs used for accessing services provided by some lower-level module (such as operating system)
GUI	Graphical user interface	A computer terminal interface, such as Windows, that is based on graphics instead of text.
Use Case Transactions		Its an atomic set of activities that are either performed entirely or not all.
Tfactor	Technical factor	Total of all technical factor. See for more details in steps in estimation. See table 4.0 for more details.
TCF	Technical Complexity	Factor which defines the complexity of the project. For more details see

	Factor	steps for UCP estimation.TCF is calculated from Tfactor.
EF	Environment Factor	This is multiplying factor.
AUCP	Adjusted Use Case Points	This the value obtained after multiplying with Efactor and Tfactor.
LOC	Lines of Code	Lines of code is counting metrics to measure volume of software product.
OOP	Object oriented programming	A programming technology in which program components are put together from reusable building blocks known as objects. [http://www.lcmug.com/glossary_O.htm [^]]
UML	Unified Modeling Language	Stands for Unified Modeling Language. UML is a standard notation and modeling technique for analyzing real-world objects, developing systems, designing software modules in object-oriented approach. UML has been fostered and now is accepted as a standard by the group for creating standard architecture for object technology, OMG (Object Management Group).[Definition taken from http://software.fujitsu.com/en/Jasmine/yougoe.html [^]]
UUCFP	Unadjusted Use Case Flow Points	Details are provided in this article. http://www.qaiindia.com/Conferences/presentations/gautam_birlasoft.pdf [^]
FP	Function Points	A sizing methodology for software projects based on functions of the software.

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Assumptions:0" />

Assumptions:

1. Readers have basic knowledge of how to write uses cases. This tutorial does not cover use cases and is only limited to estimation by "Use Cases".So if you are reading this article with out the cleared concept of Actor,Role,Scenarios.Its better not to read.
2. Use case structure varies from organization to organization which can seriously impact the Estimation. This tutorial has used Alistair Cockburn's template from Writing Effective Use Cases (**PRE-PUB. DRAFT#3**): Alistair Cockburn Humans and technology.

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Scope0" />

Scope

This tutorial is only till understanding Use Case points and does not get in to details of how to write use cases. This article will not concentrate on how to write uses cases. There are lots of tutorials on internet and also in reference section of this article the list is provided.

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HistoryandDefinitionofUseCasePoints0" />

History and Definition of Use Case Points

Working in Ericsson in the late 1960s Ivar Jacobson devised Use-Case Documents. Thanks to Ivar Jacobson to come out with such a wonderful way of communication by using Use Case Documents. Later Use Case Documents became subset of UML. In 1994, Alistair Cockburn constructed the 'Actors and Goals conceptual model' while writing use case guides for the IBM Consulting Group. It provided guidance as how to structure and write use cases. It’s the document which can stand not only for programmer, architecture but also for the stake holders. Its document which stands between the Customer and Programmers/Architecture/Business analyst/Etc.It also serves as handover when any new programmer comes in the project. Use Case document also serve as valuable input to the design of software. In short it serves in the whole life cycle of software development.Karner identified that this document can also be used to measure and estimate effort. This tutorial will make a walk through of karners work and give one sample example.So let’s start with the definition.
Use Case Point is software sizing and measurement based on Use Case Document." Use Case Point" is based on work by gustav karner in 1993.It was written as a diploma thesis at university of linkoping This work is modification of work by Allen Albrecht on function points.

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StepsforUCP(UseCasePoints)estimation0" />

Steps for UCP(Use Case Points) estimation

1. Determine the UAW (Unadjusted Actor weight) : The first step is to classify all the actors in to following classification. Table 2.0 will give you clear idea of how to classify the actors. Second column is the litmus test for making decision which type of actor falls in which category. The last column provides the factor of complexity

Table 2.0

Classification	Litmus test to recognize classifications	Value / Factor
Simple actors	Simple actors are those which communicate to System through API.	1
Average actors	Average actors are recognized if they following properties ■ Actors who are interacting the system through some protocol(HTTP,FTP, or probably some user defined protocol) ■ Actor which are data store(Files, RDBMS)	2
Complex	Complex actor is interacting normally through GUI.	3

2. Determine number of UUCW (Unadjusted Use case Weight): The second step is to count Use Cases and assign weights depending on number of scenarios and number of transactions.

Table 3.0

Use case Type	Litmus test to decide the Classification	Value / Factor
Simple	Greater than or equal to 3 transactions	5
Average	Between 4 to 7 transactions	10
Complex	Greater than 7 transactions	15

3. Determine Total UUCP (Unadjusted Use Case Point) : Total UUCP = Total UAW + Total UUCW
4. Computing technical and environmental factor: Final step is to take in to account the technical complexity. All technical factor will be assigned a value from 0 to 5 depending on complexity.

Table 4.0

	Technical factor	***Weight***	***Description***
t1	Distributed System	2	Is the system having distributed architecture or centralized architecture?
t2	Response time	1	Does the client need the system to fast? Is time response one of the important criteria?
t3	End user efficiency	1	How's the ends users efficiency?
t4	Complex Internal Processing	1	Is the Business process very complex ?. Like complicated accounts closing,Inventory

			tracking,heavy tax calculation etc.
t5	Reusable Code	1	Do we intend to keep the reusability high. So will increase the design complexity.
t6	Installation Ease	0.5	Is client looking for installation ease?.By default we get many installers which create package. But if the client is looking for some custom installation probably depending on module wise .One of our client has requirement that when the client wants to install he can choose which modules he can install. If the requirement is such that when there is a new version there should be auto installation. These factors will count when assigning value to this factor.
t7	Easy use	0.5	Is user friendly at the top priority?
t8	Portable	2	Is the customer looking for also cross platform implementation?.
t9	Easy to change	1	Is the customer looking for high customization in the future?.So that also increases the Architecture design complexity and hence this factor.
t10	Concurrent	1	Is the customer looking at large numbers of users working with locking support. This will increase the architecture complexity and hence this value.
t11	Security objectives	1	Is the Customer looking at having heavy security like SSL or have to write custom code logic for encryption.
t12	Direct access to third parties	1	Does the project depend in using third party controls. So for understanding the third-party controls and studying its pros and cons considerable effort will be required. So this factor should be rated accordingly.
t13	User training facilities	1	Will the software from user perspective be so complex that separate training has to be provided. So this factor will vary accordingly.

5. Equation for Tfactor = sum(T1....T13)
6. TCF(Technical Complexity Factor) : TCF = 0.6 + (0.01 * Tfactor).
7. EF(Environmental Factor): There are other factors like trained staff, motivation of programmers etc which has quiet a

decent impact on the cost estimate.

Table 5.0

	Environmental Factor	***Weight***	***Description***
e1	Familiarity with project	1.5	1.5 Are all the people working in the project familiar with domain and technical details of the project?. So probably you will spend your most time in explaining them all know-how's.
e2	Application experience	0.5	How much is the application experience?
e3	Objects-oriented Experience	1	As use-case documents are inputs to Object oriented design. Its important that people on the project should have basic knowledge of OOP's concept.
e4	Lead analyst capability	0.5	How the analyst who is leading the project?. Does he have enough knowledge of the domain?.
e5	Motivation	1	Are the programmers motivated for working on the project. As instability in project will always lead to people leaving half way there source code. And the hand over becomes really tough. This Factor you can put according to how software industry is going on? Example if the software market is very good put this at maximum value. As good the market more the jobs and more the programmers will jump.
e6	Stable requirements	2	Is the client clear of what he wants?. I have seen clients expectations are the most important factor in stability of requirements. If the client is of highly changing nature put this value to maximum.
e7	Part-Time Staff	-1	Are there part-time staffs in project like consultants etc?
e8	Difficult programming language	-1	How the language complexity Assembly,Vb6,c++,c etc

8. Efactor = SUM(e1...e8).

9. Calculating Environmental Factor = EF = 1.4 + (-0.03 * Efactor)
10. AUCP (Adjusted Use Case Points) : Finally calculating the Adjusted Use case points.
    AUCP = UUCP * TCF * EF
11. Multiplying by Man/Hours Factor : AUCP * Person/Hours/AUCP.

    Karner[13] proposed a factor of 20 staff hours per use case point for a project estimate.

    While sharks states that field experience has shown that effort can range from 15 to 30 hours per use case point.

    Schneider and winters proposed number of staff hours per use case point depends on the environmental factors. The number of factors in E1 through E6 that are below 3 are counted and added to the number of factors in E7 through E8 that are above 3. If the total is 2 or less, the general idea is to use twenty staff hours per UCP; if the total is 3 or 4, use twenty-eight staff hours per UCP.If the number exceeds 5, it is usually recommended that changes should be made to the project so the number can be adjusted because, in this case, the risk is unacceptably high. Another possibility is to increase the number of staff hours to thirty-six per use case point.

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Sampleprojectscope(SampleDataentry project):0" />

Sample project scope (Sample Data entry project):

Lets start with a sample fiction project.Heres the scope of the project.
TNC company till now was using manual way of maintaining its customer database and there credit card information. Data entry operator manually validates credit card information from external payment gateway. They maintain Customer Code, Customer Name, Customer Address, Customer phone and validated Customer Credit card information in Customer registry. Customer Code is unique for a customer So TNC manually check for the validations and enters in the customer registry.TNC wants the data entry project to be automated.
TNC is looking for the following automation:

- Customer Code assigned should be checked for uniqueness automatically.
- Customer Code should not exceed 8 length.
- Credit card validation should be automatic for the current System.TNC has already given the API documentation of how to interact with the third party payment system.
- Credit card length should not exceed more than 10 length.
- Data entry operator should be able to add/update/Delete customer information.
- The database will be in the TNC head office and only data entry operators will be allowed to use the Data entry Software.

- Software should work on Windows platform. At this moment TNC has Windows 2000 client installed in all computers.

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WritingusecaseforSampleDataEntry Project:0" />

Writing use case for Sample Data Entry Project:

I have used Alistair Cockburn's template for the "Use Case point" example. Use Case Template varies from person to person, project to project and organization to organization. I found Alistair's template to be complete so just took it. But there's no hard and fast rule that you have to follow this template. What will matter is what steps you write in the Use Case.

Use Case Transactions: It's an atomic set of activities that are either performed entirely or not all. What is a use case transaction and what's not just see if the transaction is adding any business value or else do not include it as a transaction. Example the user switches on the computer, user clicks on add button or any GUI is not valid business transaction step. But example the Customer Code is validated for credit card information is a valid business transaction. Use Case points are heavily affected by the way the Actors and its transactions are identified. So Use Case Document should be written by predefined guidelines, uniformly in a project. Just take a meeting with whole project team before starting writing Use Case. As the depth of the Use Case Document will affect estimation by 40%.

Table 6.0

Use Case #	DATAENTRYPROJECTCUST-1009
Use Case Name	Maintain Customer
Description	This use case depicts full maintenance of customer from project "Data Entry".
Scope and Level	■ Data Entry System (Internal) ■ Credit Card System (External)
Level	User Goal Level (If this property is not understood look at the reference for the book Writing Effective Use Cases (**PRE-PUB. DRAFT#3**) :Alistair Cockburn Humans and technology)
Primary and secondary actors	Data Entry operator.
Stakeholders and Interests	
Trigger	Data entry operator clicks on Menu "Add New Customer"
Preconditions	■ Data entry operator should be logged in.

	- Data entry operator should have access to internet.
Assumptions	Customer information received is entered manually. No Automated Import routine is in the Scope.
Failed End Condition	- Customer is not added to Database and appropriate error message is displayed. - Customer Code already existing in the Customer Database. - Customer Code length limit is exceeded. - Customer Credit Card limit is exceeded. - Customer Credit Card validation failed with the payment gateway.
Action	Add New Customer
Main success scenario (or basic Flow):	1. Data entry operator receives customer information. 2. Data entry operator enters following information - Customer Code - Customer Name - Customer Address - Customer Phone 3. Customer Code is checked if it exists in Customer Table. - If the Customer Code is existing then "Duplicate Customer Co error is raised. - If the Customer Code is more than 8 length then "Customer c length limit crossed" error is raised. 4. After step 3 is passed ok.Data entry operator enters Credit Card information. If the credit card length is more than 10 length then "Credit card length limit crossed" error is raised. 5. Credit card information is send to the external payment gateway. Appropriate APIs of the external payment gateway will be used for validity. 6. External Payment Gateway returns "OK" if credit card is validated or else will return "NOT VALID" flag. 7. Data entry operator then Adds the customer in database.
Alternate scenario (Extensions):	Update Existing Customer
	1. Data Entry operator enter Customer Code to retrieve the customer which has to be updated. 2. Data Entry operator make appropriate changes to the customer

	information. All steps and business validation from to 6 of Add new Customer is repeated. 3. Data Entry operator update the customer information.
Alternate scenario (Extensions):	Delete Existing Customer
	1. Data Entry Operator enters Customer Code to retrieve the Customer which has to be Deleted. 2. Data Entry Operator Deletes the Customer. Data Entry Operator is alerted "Are you sure you want to delete the Customer?" - If the Data entry operator clicks "Yes". Then the customer is deleted from the database. - If the Data entry operator click "NO" no action is taken.
Success Guarantee (Post conditions)	- Customer is added to Customer Database. - Customer is updated to Customer Database. - Customer is deleted from Customer Database.
Special Requirements (including Business rules):	
Technology and Data Variations List:	If Credit Card Payment Gateway API changes the interaction of the data entry customer module will have to changed accordingly.
Frequency of occurrence:	
Notes and Open Issues:	

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ApplyingUseCasePoints:0" />

Applying Use Case Points:

Let Start Applying Use Case Points to the upper given document.

- Determining Unadjusted Use Actor Weights (UAW): In this project we have identified only one actor “Data Entry Operator”. The upper Actor (Data entry operator) is complex as data entry operator will be interacting through GUI.So UAW=3 as per table Table:2.0.
- Determine number of UUCW (Unadjusted Use case Weight): There are 12 transactions [Adding also the alternative flows] in Table 6.0 Use Case. So the above Use Case is complex according to Table:3.0.So referring Table:3.0

UUCW=15.

- Now calculating the total UUCP = 15 + 3 = 18.
- Determining the technical Factor

Table 7.0

	Technical factor	***Weight***	***Value***	***Weighted Value***	***Explanation***
t1	Distributed System	2	1	2	Simple two tier architecture is decided.
t2	Response time	1	4	4	Speed is of importance as the data entry operator have to enter data quiet fast.
t3	End user efficiency	1	3	3	Data entry operator has High user efficiency.
t4	Complex Internal Processing	1	2	2	Its simple entry screen and no business process has been scoped by the client. Only credit card check and duplicate customer code is the business check.
t5	Reusable Code	1	1	1	No reusability as project is small and customer is not looking for any further changes for at least two years.
t6	Installation Ease	0.5	0	0	TNC has good in house development team and installation problems will be handled by them. Technology thought is c# and .NET setup wizard will be enough to make the installation process easy.
t7	Easy use	0.5	4	2	Yes data entry operator for fast entry of data has to have user friendly menus and shortcut keys.
t8	Portable	2	1	2	TNC has windows 2000 client as specified in the scope document.
t9	Easy to change	1	0	0	None specified by client
t10	Concurrent	1	0	0	Client has not clarified about this

					issue as such in the scope document. So assumed least concurrent.
t11	Security objectives	1	0	0	None specified by client. Even credit card information will be passed with out encryption.
t12	Direct access to third parties	1	3	3	Using the credit card check API
t13	User training facilities	1	0	0	The screen is simple and data entry operator can operate with out any training
	Total			19	

- Depending on the table calculating the Technical Factor: TCF = 0.6 + (0.01 * Tfactor) = 0.6 + (0.01 * 19) = 0.79
- Calculating environmental factor

Table 8.0

	Environmental Factor	***Value***	***Weight***	***Weighted Columns***	***Explanation for the value assigned***
e1	Familiarity with project	5	1.5	7.5	It's a simple project so familiarity with project is not so much needed.
e2	Application experience	5	0.5	2.5	Its simple application.
e3	Objects-oriented Experience	5	1	5	Every one has well oops knowledge.
e4	Lead analyst capability	5	0.5	2.5	Its simple project no lead analyst needed till now.
e5	Motivation	1	1	1	Motivation is little down as programmers are reluctant to work on the project because of its simplicity.
e6	Stable requirements	4	2	8	Client is very clear with what he wants?
e7	Part-Time Staff	0	-1	0	No part time staffs

e8	Difficult programming language.	3	-1	-3	C# will be used. And most of programming guys are new the C# technology.

- According to [Kirsten Ribu Master of Science Thesis] Environmental factor play very important role in the estimation. A slight variation will increase the use case point by very very drastic amount. Even small adjustments of an environmental factor, for instance by half a point, can make a great difference to the estimate. Difference 3 to 2.5 increased the estimate by 4580 hours, from 10831 to 15411 hours, or 42.3 percent. This means that if the values for the environmental factors are not set correctly, there may be disastrous results -- Sources [Kirsten Ribu Master of Science Thesis] Do see links below.
- Using formulae for calculating EF = 1.4 + (-0.03 * Efactor) = 1.4 + (-0.03 * 23.5) = 0.695
- Calculating AUCP = UUCP * TCF * EF = 18 X 0.79 X 0.695 = 9.88 approx = 10 Use Case Points.I have out the approximation as its only creates 3 to 4 hours of difference.
- Calculating According to Karner i.e 20 staff hours per use case points = 10 X 20 = 200 hours for the total project.
- If programmer works for 8 hours for a day then 340/8 = 25 days.
- Calculating according to Schneider and winters from e1 to e6 there are only 3 properties that are below 3.and from e7 to e8 there are none value above 3.So the total is 3 so we use 28 staff hours.10 X 28 = 280 hours. If programmer works for 8 hours then 35 days. If this step is not understood look at the steps defined in theory of use case points.

  If we apply sixth sense we will find karner approach is coming to round about figure. It really depends what you want to follow karner or Schneider approach. Best is that after 2 or 3 projects what's ever is coming accurate from history take that approach. Best approach is to use excel and incorporate formulae's properly.

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Finalquotation:0" />

Final quotation:

So here the final quotation to the scope defined and the use case document.

Table 9.0
XYZ SOFTWARE COMPANY
To: TNC Limited, Western road 17, California. Quotation number: 90 Date: 1/1/2004 Customer ID: - 20090DATAENTRY

Quantity	Description	Discount	Taxable	Total
1	Data Entry Module	0%	0%	840 $
Quotation Valid for 100 days Goods delivery date with in 25 days of half payment Quotation Prepared by: - XYZ estimation department Approved by :- SPEG department XYZ				

In this quotation I have taken karners value that's 25 days. One programmer will sit on the project with around 1000 $ salary. So his 25 days salary comes to 840 dollars approx. The upper quotation format is in its simplest format. Every company has his quotation format accordingly. So no hard and fast rule of quotation template.But still if interested http://www.microsoft.com/mac/resources/templates.aspx?pid=templates [^] has good collection of decent templates.

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Use-CasestructureMatters:0" />

Use-Case structure Matters :

The structure of use-case matters a lot. According to (Bente Anda,Hege Dreiem,Dag I.K Sjoberg and Magne jorgensen) the following aspects of structure has an impact :

- ***The use of generalization between actors :*** If two actors have 80 percent in common put them in generalization relationship and count them only once. This will increase the accurate of the estimate.
- ***The use of included and extending use case :***Karner recommends that included and extending use case should not be counted. But according to (Bente Anda,Hege Dreiem,Dag I.K Sjoberg and Magne Jorgensen) have a different opinion in there practical experience. In some use cases they found include and extended use cases as essential functionalities and reducing them will reduce steps and hence the estimation.
- ***The level of detail in the use case description. (This is dependent on the guy who writes the use case)***
  The level of detail and transaction in use case impact the use-case estimation a lot. If you see the upper use-case if I had written steps like user switches on the PC etc.The transaction would have increased and hence estimation. So if that transaction step is not adding business value do not add it as transaction step. This will also increase the estimation to a good level.

  Including the above recommendation by Karner and (Bente Anda,Hege Dreiem,Dag I.K Sjoberg and Magne jorgensen) here are also my inputs which can be followed to make a estimate better :-
- ***Use-Case Splitting and Merging***
  Simple Use-Case masters matter a lot. Writing use-cases for example "Adding Country Master". User can write 3

different use cases for Add, Update, Delete or he can write one use-case and put the Update and delete in alternate scenarios. If the Update and delete do not have different business validations put them in one use-case. During my counting I had seen that accuracy increases if for simple master we put them in one use-case.

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AdvantagesofUsingUse-Case Points0" />

Advantages of Using Use-Case Points

- ***Automation :*** Use Case document if structured properly for a company (Uniformly) we can use automation tools. In case of FP this is difficult.

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DisadvantagesofUsingUse-Case Points0" />

Disadvantages of Using Use-Case Points

- ***Can not be used during initial phase:*** Estimations are normally done at earlier stage of projects. When we say earlier means during the first and second meet with the client. Use case documents are mostly prepared after the project sign off. So during earlier stage this document will not be available. Preparing Use Case document during first and second meet with client means wasting your resources in case you do not get the project. For initial phase of project you can use “Function points”. For function points no formal document is needed. My old tutorial on function points http://www.geocities.com/shiv_koirala/fp/fp.html [^].
- ***No Standard Use Case Document:***The document structure of use is not standard still. It varies not only from company to company but also from project to project. So the estimation has significant variance according to structure of Use Case documents. Even the writing matter to a large extent. And also how one does identifies use-case and the transaction associated with it. Free textual descriptions may lead ambiguous specification [AP98].
- ***Maintenance estimation problems:***Function point [http://www.geocities.com/shiv_koirala/fp/fp.html [^]] failed for maintenance projects. It will be difficult from Use Case Points to do maintenance estimation.
- ***Actor identification need technical details:***In order that the actor be classified we need to know technical details like which protocol the actor will use. So estimation can be done by technical guys.FP is not technical dependent [http://www.geocities.com/shiv_koirala/fp/fp.html [^]].

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OtherGeneralPracticalFactors0" />

Other General Practical Factors

The below points are not related to Use as such but general while making estimation.

- ***Change of psychology :***Estimator should not be biased. If you are employee of the company do not add extra charge or subtract extra charges. These all things will be handled at the negotiation tables between the software company director and the customer. A estimator job is to show the real cost of the software to the company. In short estimator should not be bothered about negotiation phase and will we get this project or not?. Leave that work to the companies director. And if you are the director of the company think that thing after estimation is over.
- ***Sixth Sense Approach:***Any of the software measurement ways (Use case, Function points, LOC etc) are evolving and under practice. After looking the figure try to give Sixth sense based on your past experience. Some time estimation will be fair if went the ADHOC way.
- ***Modular Estimation:***In huge projects with 100 of modules its better to estimate modular wise. Example if a client is asking for a customer module, Supplier module and Accounts module. Estimate them differently so that on negotiation table with client you can show him the complete break up. Second this approach is very useful for phase wise estimation. Client can decide either to not take the module (Due to financial concerns) or move it to phases.
- ***Information Creep and Grey Areas:***Estimation are normally done at the initial phase itself probably with one or two meets with client we have to give estimation. So but natural many of the areas there can be creep. The best way for such situation is to think the maximum possibility and estimate. Example if any customer says that he needs chat module and no clarification is made till what the depth it is, estimate to maximum possibility of how can chat application are made. Later during negotiation table show client the estimation basis. So according to the client financial budget changes will be made.
- ***Other Costing :***Any of the Software estimation methodology do not give cost for non-software factors.
  - If the software is using any third-party components example crystal reports etc estimate them in a ADHOC way.
  - Example if in the project company is also providing web hosting, domain name, hard ware etc put them separately.
  - Any training involved estimate them separately.
- ***Assumptions:*** As estimation is done at the initial stage there can be lot of creep and gray areas. Due to gray areas estimation has to be supported by proper assumptions.
- ***Review from Third Party:*** Before sending the costing to the client review it internally from third person who is not involved in the project.
- ***Iterations:***Iterate it as many as times possible and at various phases. Example use function point to iterate during scoping phase that's initial phase. And Use case Point during the System requirement phase. This gives a good idea before implementing that is the costing proper
- ***Two teams Estimation:***During estimation have two teams which will do the estimation. So that cross verification can

be done on the error percent of the estimation.

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References

It would be selfish on part to say that the whole article is my own wisdom. So I have provided all the links i have referred to prepare this article. If any of the link is copyright and not to be produced please email me at shiv_koirala@yahoo.com I will see to my best that i preserve the copyright.

- I work presently in Ag-technologies. Thanks to http://www.ag-technologies.com [^] for providing me role in estimation phase.
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- For dictionary meaning of quotation http://elmo.shore.ctc.edu/jbaker/glossery.htm [^]
- If your are looking at test effort using Use Case Points have look at the following paper Cognizant technology solutions Quality week 2001 san Francisco California USA June 2001 by Suresh Nageswaran.
- In this paper they experimented using UUCFP (Unadjusted Use Case Flow Points) for accuracy.http://www.qaiindia.com/Conferences/presentations/gautam_birlasoft.pdf [^] by gautam banerjee (Annual IPML conference 2004)
- Excellent quotation templates at http://www.microsoft.com/mac/resources/templates.aspx?pid=listbyprod&cat=1&scat=8&app_id=2&catname=Quotations [^] http://www.microsoft.com/mac/resources/templates.aspx?pid=templates [^] .Not necessary to follow exactly as it is but just for reference.
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Last Words

Software war for the best estimation has been going on for years. I am not pointing in this article that Use Case Point is the best way to do estimation. So you will find i have introduced the advantages and disadvantages section .But definitely we have to measure , one day we have to unify on a common measurement principle. If we can say in real life city "xyz" is 100 kilometers far why can not we say this project is of 1000 complexity,200 function points or 650 use case points. Different languages, Different compliers, Different processes companies follow has made it difficult to come to common grounds and common measurement.But the largest hurdle we see is the software companies attitude to come to common conclusion of how to measure. If software can automate human complexity then software measurement also can be automised.

"We should no longer ask if we should measure, the question today is how ?" - Dieter Rombach Eurometrics 1991"
"Do not quote too less that programmers work for over night, you lose the project or end doing social service, or loss. Do not quote too high that you lose the project. Be fair to yourself and your customer."

Shivprasad Koirala. Mail me at shiv_koirala@yahoo.com [^].

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About Shivprasad Koirala

My most prime interest is playing with my kid.But secondary interest is programming and softwares........Just to inform all i am coming out with a estimation book and looking forward to see in book stores.......... Here are some snippets of the book www.geocities.com/shiv_koirala/

Click here if you want to know more about Shivprasad Koirala.

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