

ISBSG Comparative Estimating Tool

User Guide

Introduction

This document provides a user guide for the ISBSG Comparative Estimating Tool.

- For a description of the estimating process implemented by the tool, see Section 1: Comparative Project Estimating.
- For details on using the tool, see Section 2: Using the ISBSG Comparative Estimating Tool.

1. Comparative Project Estimating

The ISBSG Comparative Estimating Tool is used to generate estimates of software project effort, delivery rate, duration and speed of delivery. These estimates are determined from the averages of project delivery rates and speed of delivery for a selection of projects taken from the ISBSG repository that are deemed to be similar to the project for which the estimate is required.

The estimating process used by the tool is as follows:

1. Prior to generating the estimate, the selection of ISBSG repository projects is restricted to those with the following attributes:
 - ❖ A or B data quality rating
 - ❖ Functional size expressed in IFPUG 4+ and NESMA (development only) Function Points
 - ❖ Effort recorded at the core development team level (level 1).

The impact of these restrictions is to:

- ❖ Eliminate any projects for which ISBSG has doubts about the data validity
- ❖ Ensure that all selected projects have been sized using the same technique and
- ❖ Ensure that all selected projects have recorded effort in the same manner.

2. Generating a new estimate begins by further limiting the selection of projects to be considered by the tool to those that are similar to the project for which the estimate is required. The selection of projects to be considered can be limited by the following attributes:

- ❖ Function point size range
- ❖ Development type
- ❖ Development platform

These attributes have been chosen because analysis by ISBSG and others has consistently shown that they can have considerable impact on project delivery rate and speed of delivery. It would therefore be invalid to utilise projects that have one particular value for one of these attributes to estimate the effort or duration of a project that has a different value. For example, it would be invalid to utilise 'enhancement projects' to estimate the effort for 'new development projects'.

3. Next, the functional size of the project for which the estimate is required is specified. The project's functional size will be combined with the estimated delivery rate and speed of delivery to generate the effort and duration estimates.

4. Specifying values for some or all of the following selection of project attributes completes setting up the data for the new estimate:

- ❖ Primary programming language
- ❖ Organisation type
- ❖ Application type
- ❖ Maximum team size
- ❖ Used prototyping
- ❖ Used JAD
- ❖ Web development

5. The first estimates generated are a collection of project delivery rate and speed of delivery values. Each of these initial estimates addresses one of the specified project attributes. The initial estimates are determined by calculating the likely (median) delivery rate and speed of delivery values for all projects, (from the repository data sub-set), that match the specified attribute value. For example, the following single attribute estimates might be calculated:

Attribute	Value	Project Delivery Rate (hours per function point)	Speed of Delivery (function points per month)
...
Primary programming language	C#	16.5	55.5
Application type	Management Information System	9.3	94.0
...

Median values are used as opposed to mean values to restrict the impact of outliers on the estimates.

6. Overall estimates of project delivery rate and speed of delivery are now generated by calculating the averages (means) of the collections of single project attribute estimates. The purpose of this step is to attempt to determine project delivery rate and speed of delivery estimates that at least consider a range of attribute values that match the project for which the estimates are required. It is imperative to note, however, that this is an informal procedure that **does not** utilise formal statistical techniques such as stepwise regression analysis when determining the influence of each individual project attribute on the estimates.
7. Finally, the overall estimates of project delivery rate and speed of delivery are extended to effort and duration by incorporating the specified project functional size and utilising the following simple formulae:
 - ❖ Effort (hours) = Size * PDR
 - ❖ Duration (months) = Size / SD

The effort and duration estimates address the full software development life cycle (ie planning, specification, design, building, testing and implementation).

The effort estimate addresses the effort associated with the:

- ❖ Core software development team (ie project team, project management and project administration)

It does not address the additional effort associated with the:

- ❖ Development team support
- ❖ Computer operations support or
- ❖ End-users or clients.

Caution

- a) It is important to be aware of the “Number of matches” found for each project attribute. A low number of matches could provide misleading data, (for example the projects might all be from the same organisation).
- b) You should not attempt to use the Comparative Estimating Tool data for any other purpose. The license is for use of the tool only. The data incorporated is a special data subset extracted specifically for this tool.

2. Using the ISBSG Comparative Estimating Tool

Running the Tool

The ISBSG Comparative Estimating Tool is a Microsoft Excel spreadsheet application.

To run the tool, open the file Comparative Estimating Tool V60.xls.

Depending upon the version of Excel and Windows that you are running you may get the following message:

- ❖ “Macros in this workbook are disabled because security level is high ...”

To change your security level: Select Tools, then Options, then the Security tab, then the Macro Security button. Set the Security Level to ‘Medium’. Once this is done when you open a macro based spreadsheet you will be prompted to enable or disable the macros. It is necessary to enable macros to use the spreadsheet.

The tool utilises the following layout:

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Comparative Estimating Tool V6.0
using the ISBSG project data

Inputs

Filters

Functional size (function points):
Match all

Development platform:
Match all

Development type:
Match all

Parameters

Functional size (function points):
100

Range minimum (percentile):
20

Range maximum (percentile):
80

Estimate

Reset

Project attributes

Primary programming language: Match none

Organisation type: Match none

Application type: Match none

Maximum team size: Match none

Used prototyping: Match none

Used JAD: Match none

Web development: Match none

Number of matches	Project Delivery Rate			Speed of Delivery		
	Optim 20 %	Likely Median	Conserv 80 %	Conserv 20 %	Likely Median	Optim 80 %

Estimates	Project Delivery Rate	Project Work Effort	Speed of Delivery	Project Duration
Level 1 - Dev Team	<i>(hours per function point)</i>	<i>(hours)</i>	<i>(function points per month)</i>	<i>(months)</i>
Optimistic	Not Defined	Not Defined	Not Defined	Not Defined
Likely	Not Defined	Not Defined	Not Defined	Not Defined
Conservative	Not Defined	Not Defined	Not Defined	Not Defined

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Generating Estimates

Specifying Project Filters:

To constrain the collection of projects used in generating the estimate, specify values for 'Functional size', 'Development platform' and 'Development type' by selecting from the respective drop-down lists within Inputs:Filters.

Filters	
Functional size (function points):	0 - 500
Development platform:	PC
Development type:	Enhancement

Only the projects that match all of the filter values will be considered as candidates for use in generating the estimate. To ignore any of the three filters, select 'Match all' from the filters' drop-down lists.

Specifying Project Size:

To specify the functional size of the project to be estimated, enter the size in IFPUG 4+ Function Points into the cell labelled 'Functional Size' within Inputs: Parameters.

Functional size (function points):
100

The size must be an integer greater than 0.

Specifying an Optimistic to Conservative Estimate Range:

In addition to generating likely estimates based upon project median values, the tool can also generate an optimistic to conservative estimate range based upon user specified percentile values. To specify the values for the optimistic to conservative estimate range, enter the percentile values into the cells labelled 'Range minimum' and 'Range maximum', respectively, within Inputs: Parameters.

Range minimum (percentile):	20
Range maximum (percentile):	80

The range minimum must be an integer between 0 and 49. The range maximum must be an integer between 50 and 100.

Specifying Project Attribute Values:

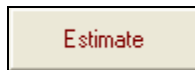
Specify attribute values for the project to be estimated by selecting from the respective drop-down lists with the Project attributes table.

Project attributes		Number of matches	Project Delivery Rate			Speed of Delivery		
			Optim 20 %	Likely Median	Conserv 80 %	Conserv 20 %	Likely Median	Optim 80 %
Primary programming language:	C#							
Organisation type:	Insurance							
Application type:	Decision Support System							
Maximum team size:	3 - 4							
Used prototyping:	Match none							
Used JAD:	Yes							
Web development:	Yes							

For any attributes that are irrelevant to the project to be estimated, or for which none of the available values match, select the value 'Match none' from the attributes' drop-down lists.

Generating Project Estimates:

To generate the project estimates based upon the specified filters, parameters and project attributes, select the Estimate button. The tool generates the project estimates and displays the results in the Project attributes and Estimates tables.



Each row in the Project attributes table displays the number of matches and optimistic, likely (median) and conservative project delivery rate and speed of delivery estimates for projects matching a single attribute value.

Project attributes		Number of matches	Project Delivery Rate			Speed of Delivery		
			Optim 20 %	Likely Median	Conserv 80 %	Conserv 20 %	Likely Median	Optim 80 %
Primary programming language:	C#	43	8.2	16.5	31.4	19.5	30.7	55.5
Organisation type:	Insurance	256	6.7	15.9	33.7	18.3	44.7	105.5
Application type:	Decision Support System	10	9.3	21.1	31.2	11.0	23.2	34.6
Maximum team size:	3 - 4	164	3.0	6.2	13.9	16.7	36.0	83.0
Used prototyping:	Match none	0						
Used JAD:	Yes	76	5.3	13.5	35.4	16.3	37.9	79.0
Web development:	Yes	341	4.8	7.3	15.8	18.3	34.2	91.4

The Estimates table displays the overall optimistic, likely and conservative project estimates for project delivery rate, work effort, speed of delivery and duration.

Estimates	Project Delivery Rate	Project Work Effort	Speed of Delivery	Project Duration
Level 1 - Dev Team	<i>(hours per function point)</i>	<i>(hours)</i>	<i>(function points per month)</i>	<i>(months)</i>
Optimistic	6.2	621	74.8	1.3
Likely	13.4	1,342	34.4	2.9
Conservative	26.9	2,691	16.7	6.0

Resetting the Estimate:

To reset the values in the Project attributes and Estimates tables, select the Reset button.



Note: If you cross check the results from this tool against your own calculations, small variations that you might uncover are a result of rounding that takes place during the tool’s calculations.