



User Manual

COCOMO II.2000 Early Design Model Spreadsheet Implementation (Microsoft Excel 1997)

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Manual for the Spread Sheets of Early Design Model

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I. Explanation of COCOMO Spreadsheet Manual for Early Design Model

There are 29 spreadsheets in this COCOMO Spreadsheet Early Design Model.

The users can find the following information at this manual.

- the functions of each spreadsheet
- the functions and operations of some specific cells
- the specific linkages of the factors in the spreadsheets

The Sources Of The Rating Values And The Formula

Rating Values : COCOMO manual

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Formula : COCOMO Manual

EarlyDsgn

Scale Factor (SF) Section

This section contains Scale Factors : PREC, FLEX, RESL, TEAM, and PMAT.
For the full titles and the explanations of above factors, please check COCOMO II manual.

	Very Low	Low	Norm	High	Very High	Extra High	Result
PREC	6.20	4.96	3.72	2.48	1.24	0.00	6.20
FLEX	5.07	4.05	3.04	2.03	1.01	0.00	4.05
RESL	7.07	5.65	4.24	2.83	1.41	0.00	7.07
TEAM	5.48	4.38	3.29	2.19	1.10	0.00	5.48
PMAT	7.80	6.24	4.68	3.12	1.56	0.00	7.80

The Scale Values are linked to the spreadsheet of the specific Scale Factor individually.

All the results are from the input of each file of each factor. Users can go to each file of each factor to change the values.

The buffer values of the scales of each factor are listed as follows.

	Very Low	Low	Norm	High	Very High	Extra High
PREC	6.20	4.96	3.72	2.48	1.24	0.00
FLEX	5.07	4.05	3.04	2.03	1.01	0.00
RESL	7.07	5.65	4.24	2.83	1.41	0.00
TEAM	5.48	4.38	3.29	2.19	1.10	0.00
PMAT	7.80	6.24	4.68	3.12	1.56	0.00

SF

The SF formula is $PREC + FLEX + RESL + TEAM + PMAT$

B Calculation Section

The formula is as follows.

$B = 0.91 + 0.01 * (PREC + FLEX + RESL + TEAM + PMAT)$

EM section

This section contains PERS, RCPX, RUSE, PDIF, PREX, FCIL, and SCED.
For the full titles, and the explanations of above factors, please check COCOMO II manual.

The values of the scales are linked to files of the factors individually.

The COCOMO II-2000 calibrated values of the scales of each factor are listed as follows.

	Extra Low	Very Low	Low	Nominal	High	Very High	Extra High
PERS	2.12	1.62	1.26	1.00	0.83	0.63	0.50
RCPX	0.49	0.60	0.83	1.00	1.33	1.91	2.72
RUSE	-----	-----	0.95	1.00	1.07	1.15	1.24
PDIF	-----	-----	0.87	1.00	1.29	1.81	2.61
PREX	1.59	1.33	1.12	1.00	0.87	0.74	0.62
FCIL	1.43	1.30	1.10	1.00	0.87	0.73	0.62
SCED	-----	1.43	1.14	1.00	1.00	1.00	-----

EM

EM= PERS*RCPX*RUSE*PDIF*PREX*FCIL*SCED

Reference Section

The area within C37, I37, I51, and C51 is for the reference of EM grade.

Each Early Design Model EM is evaluated mainly by some other detail factors.

PERS is evaluated by ACAP, PCAP, PCON. This is the group of factors for evaluating Personnel Capability.

RCPX is evaluated by RELY, DATA, CPLX, DOCU. This is the group of factors for evaluating Product.

RUSE is evaluated by RUSE. This is the factor for evaluating Required Reuse.

PDIF is evaluated by TIME STOR PVOL. This is the group of factors for evaluating Platform Difficulty.

PREX is evaluated by APEX, PLEX, LTEX. This is the group of factors for evaluating Personnel Experiences.

FCIL is evaluated by TOOL and SITE. This is the group of factors for evaluating facilities.

SCED is evaluated by SCED. This is the factor for evaluating Schedule.

This section contains the grades linked from each file of the evaluate factors.

Section of Calculation

PM formula

PM=EM*A*[(1=BRAK/100)*SIZE]^B+[(ASLOC*AT/100)/ATPROD]

EM Cost drivers that have a multiplicative effect on predicting effort are called Effort Multipliers (EM). Each EM has a rating level that expresses the impact of the multiplier on development effort, PM. These rating can range from Extra Low to Extra High. For the purposes of quantitative analysis, each rating level of each EM has a weight associated with it. The nominal or average weight for an EM is 1.0. If a

rating level causes more software development effort, then its corresponding EM weight is above 1.0. Conversely, if the rating level reduces the effort then the corresponding EM weight is less than 1.0. The selection of effort-multipliers is based on a strong rationale that they would independently explain a significant source of project effort or productivity variation.

A is a constant. The buffer value is set as 2.94.

BRAK should be input by the users. COCOMO II uses a breakage percentage, BRAK, to adjust the effective size of the product. Breakage reflects the requirements volatility in a project. It is the percentage of code thrown away due to requirements changes. For example, a project which delivers 100,000 instructions but discards the equivalent of an additional 20,000 instructions has a BRAK value of 20. This would be used to adjust the project's effective size to 120,000 instructions for a COCOMO II estimation

SIZE should be input by the users.

B is the sum of project scale factors. It is linked from result at B Section in this spreadsheet.

ASLOC should be input by the users. It is use to estimate the amount of code to be adapted

AT should be input by the users.

ATPROC should be input by the users.

PM is the estimated person-months with the SCED effort multiplier

'**EM** is the result of the calculation of EM without SCED.

'**PM** is the estimated person-months without the SCED effort multiplier

TDEV is the calendar time in months from the determination of a product's requirements baseline to the completion of an acceptance activity certifying that the product satisfies its requirements. The formula is $[3.67 * 'PM^{(0.28+0.2*(B-1.01))}] * SCED\%/100$

SCALE FACTORS

PREC

Type : Scale Factor

The spreadsheet contains the features of PREC and the evaluation rates.

Features of Evaluate PREC : Users should select ratings by type "xxxx" under each selected value. The selected rating values are overridable in the purple cells.

SUM : The SUM of the results would be calculated and presented next to "SUM".

Your rating : According to the SUM, the users can choose the rating value from the scale list by typing "xxxx" under the selected rate. The selected rating values are overridable in the purple cells.

The COCOMO II-1998 calibrated values of the scales of PREC are listed as follows.

	Very Low	Low	Norm	High	Very High	Extra High
PREC	6.20	4.96	3.72	2.48	1.24	0.00

PREC (B37): The selected value of PREC is shown next to "PREC" on this page and one the EarlyDsgn summary worksheet "selected value" column for PREC.

FLEX

Type : Scale Factor

The spreadsheet contains the features of FLEX and the evaluation rates.

Features of Evaluate FLEX : Users should select ratings by type "xxxx" under each selected value. The selected rating values are overridable in the purple cells.

SUM : The SUM of the results would be calculated and presented next to "SUM".

Your rating : According to the SUM, the users can choose the rating value from the scale list by typing "xxxx" under the selected rate. The selected rating values are overridable in the purple cells.

The COCOMO II-1998 calibrated values of the scales of FLEX are listed as follows.

	Very Low	Low	Norm	High	Very High	Extra High
FLEX	5.07	4.05	3.04	2.03	1.01	0.00

FLEX (B33) : The selected value of FLEX is shown next to "FLEX" on this page and one the EarlyDsgn summary worksheet "selected value" column for FLEX.

RESL

Type : Scale Factor

The spreadsheet contains the features of RESL and the evaluation rates.

Features of Evaluate PREC : Users should select ratings by type "xxxx" under each selected value. The selected rating values are overridable in the purple cells.

SUM : The SUM of the results would be calculated and presented next to "SUM".

Your rating : According to the SUM, the users can choose the rating value from the scale list by typing "xxxx" under the selected rate. The selected rating values are overridable in the purple cells.

The COCOMO II-1998 calibrated values of the scales of RESL are listed as follows.

	Very Low	Low	Norm	High	Very High	Extra High
RESL	7.07	5.65	4.24	2.83	1.41	0.00

RESL (B61) : The selected value of RESL is shown next to "RESL" on this page and one the EarlyDsgn summary worksheet "selected value" column for RESL.

TEAM

Type : Scale Factor

The spreadsheet contains the features of TEAM and the evaluation rates.

Features of Evaluate PREC : Users should select ratings by type "xxxx" under each selected value. The selected rating values are overridable in the purple cells.

SUM : The SUM of the results would be calculated and presented next to "SUM".

Your rating : According to the SUM, the users can choose the rating value from the scale list by typing "xxxx" under the selected rate The selected rating values are overridable in the purple cells.

The COCOMO II-1998 calibrated values of the scales of TEAM are listed as follows.

	Very Low	Low	Norm	High	Very High	Extra High
TEAM	5.48	4.38	3.29	2.19	1.10	0.00

TEAM (B37) : The selected value of TEAM is shown next to "TEAM" on this page and one the EarlyDsgn summary worksheet "selected value" column for TEAM.

PMAT

Type : Scale Factor

The spreadsheet contains PMAT evaluation rates.

Features of Evaluate PMAT : Users should select ratings by type "xxxx" under each selected value. The selected rating values are overridable in the purple cells.

The COCOMO II-1998 calibrated values of the scales of PMAT are listed as follows.

	Very Low	Low	Norm	High	Very High	Extra High
PMAT	7.80	6.24	4.68	3.12	1.56	0.00

PMAT is not applied to some specific situations, such as some short-term student projects. We suggest the users put **9.36** as the value of "**for not apply**" in PMAT.

Your rating : The users can choose the rating value from the scale list by typing "xxxx" under the selected rate. The selected rating values are overridable in the purple cells.

PMAT (B12) : The selected value of PMAT is shown next to "PMAT" on this page and one the EarlyDsgn summary worksheet "selected value" column for PMAT.

PMAT Eval

PMAT Eval is to assist to evaluate PMAT. It is the sub-spreadsheet for PMAT. The spreadsheet contains the PMAT features, Key Process Areas, and the evaluation rates.

Rating : The users can choose the rating value from the scale list by typing "x" in the selected rate of each feature. The selected rate would be presented at **rating** column.

GROUP OF PERSONNEL CAPABILITY

It is mainly evaluated by PERS. PERS can be evaluated by ACAP, PCAP, and PCON.

PERS

Type : Effort Multiplier

PERS is the main EM factor in Early Design Model. It could be evaluated by ACAP, PCAP, and PCON detail factors.

The spreadsheet contains PERS features and the its evaluation rates.

ACAP (B8): It is linked from the result of ACAP spreadsheet.

PCAP(C8): It is linked from the result of PCAP spreadsheet.

PCON(D8) : It is linked from the result of PCON spreadsheet.

TOTAL (F8) : The sum of ACAP, PCAP, and PCON.

Alternative : There are two alternatives to assist to evaluate PERS. The users can use either one of them. In either one alternative, users should select ratings by type "xxxx" under each selected value. The selected rating values are overridable in the purple cells.

Rating : After considering the ratings in the selected alternative, the users can choose the rating value from the scale list by typing "xxxx" under the selected rate The selected rating values are overridable in the purple cells.

The COCOMO II-2000 calibrated values of the scales of PERS are listed as follows.

	Extra Low	Very Low	Low	Nominal	High	Very High	Extra High
PERS	2.12	1.62	1.26	1.00	0.83	0.63	0.50

PERS Eval

ACAP

Type : Reference Effort Multiplier

ACAP helps to evaluate PERS Early Design Model.

Rating : After evaluating ACAP by its feature, the users should select the rating by type "xxxx" under the selected value. The selected rating value is overridable in the purple cell.

ACAP (B10) : It is linked from G8. This value is linked to be presented in EarlyDsgn spreadsheet.

PCAP

Type : Reference Effort Multiplier

PCAP helps to evaluate PERS Early Design Model.

Rating : After evaluating PCAP by its feature, the users should select the rating by type "xxxx" under the selected value. The selected rating value is overridable in the purple cell.

PCAP (B24) : It is linked from G22. This value is linked to be presented in EarlyDsgn spreadsheet.

PCON

Type : Reference Effort Multiplier

PCON helps to evaluate PERS Early Design Model.

Rating : After evaluating PCON by its feature, the users should select the rating by type "xxxx" under the selected value. The selected rating value is overridable in the purple cell.

PCON (B36) : It is linked from G34. This value is linked to be presented in EarlyDsgn spreadsheet.

GROUP OF PRODUCT

It is mainly evaluated by RCPX. RCPX can be evaluated by RELY, DATA, CPLX, and DOCU.

RCPX

Type : Effort Multiplier

RCPX is the main EM factor in Early Design Model. It could be evaluated by RELY, DATA, CPLX and DOCU detail factors.

The spreadsheet contains RCPX features and the its evaluation rates.

RELY (B9): It is linked from the result of RELY spreadsheet.

DATA(C9): It is linked from the result of DATA spreadsheet.

CPLX(D9) : It is linked from the result of CPLX spreadsheet.

DOCU(E9) : It is linked from the result of DOCU spreadsheet.

TOTAL (G9) : The sum of RELY, DATA, CPLX and DOCU.

Alternative : There are two alternatives to assist to evaluate RCPX. The users can use either one of them. In either one alternative, users should select ratings by type "xxxx" under each selected value. The selected rating values are overridable in the purple cells.

Rating : After considering the ratings in the selected alternative, the users can choose the rating value from the scale list by typing "xxxx" under the selected rate. The selected rating values are overridable in the purple cells.

The buffer values of the scales of RCPX are listed as follows.

	Extra Low	Very Low	Low	Nominal	High	Very High	Extra High
RCPX	0.49	0.60	0.83	1.00	1.33	1.91	2.72

RCPX Eval - CPLX

RELY

Type : Reference Effort Multiplier

RELY helps to evaluate RCPX Early Design Model.

Rating : After evaluating RELY by its feature, the users should select the rating by type "xxxx" under the selected value. The selected rating value is overridable in the purple cell.

RELY (B11) : It is linked from G9. This value is linked to be presented in EarlyDsgn spreadsheet.

DATA

Type : Reference Effort Multiplier

DATA helps to evaluate RCPX Early Design Model.

Rating : After evaluating DATA by its feature, the users should select the rating by type "xxxx" under the selected value. The selected rating value is overridable in the purple cell.

DATA (B25) : It is linked from G23. This value is linked to be presented in EarlyDsgn spreadsheet.

DOCU

Type : Reference Effort Multiplier

DOCU helps to evaluate RCPX Early Design Model.

Rating : After evaluating DOCU by its feature, the users should select the rating by type "xxxx" under the selected value. The selected rating value is overridable in the purple cell.

DOCU (B37) : It is linked from G35. This value is linked to be presented in EarlyDsgn spreadsheet.

CPLX

CPLX

Type : Reference Effort Multiplier

CPLX helps to evaluate RCPX Early Design Model.

CPLX spreadsheet contains CPLX features and the its evaluation rates.

Rating : After evaluating CPLX by its features, the users should select the ratings by type "xxxx" under the selected values. The selected rating values are overridable in the purple cells.

SUM (B64) : It is the sum of the rating grades.

Rating : Based on the SUM and the suggested ratings, the users should select a rating value (from B68 to L68) by type "xxxx" under the selected value. The result would be presented at M67 and M68.

CPLX (B70) : It is linked from M68. This value is linked to be presented in EarlyDsgn spreadsheet.

GROUP OF REQUIRED REUSE

It is mainly evaluated by RUSE.

RUSE

Type : Effort Multiplier.

RUSE spreadsheet contains RUSE features and the its evaluation rates.

Evaluation : At the orange area, the users can evaluate the RUSE by its feature. Then, the users select the rating value by typing "xxxx" under the selected rating. The value would be presented at G9 and G10. This value is also linked to Reference Section at the first spreadsheet in this spreadsheet tool.

Rating : The users can choose the rating value from the scale list by typing "xxxx" under the selected rate. The selected rating values are overridable in the purple cells.

The buffer values of the scales of RUSE are listed as follows.

	Extra Low	Very Low	Low	Nominal	High	Very High	Extra High
RUSE	-----	-----	0.95	1.00	1.07	1.15	1.24

GROUP OF PLATFORM DIFFICULTY

It is mainly evaluated by PDIF. PDIF can be evaluated by TIME, STOR, and PVOL.

PDIF

Type : Effort Multiplier

PDIF is the effort multiplier for evaluating platform difficulty. It can be evaluated by TIME, STOR, and PVOL.

PDIF spreadsheet contains PDIF features and the its evaluation rates.

TIME (B7): It is linked from the result of TIME spreadsheet.

STOR (C7): It is linked from the result of STOR spreadsheet.

PVOL (D7) : It is linked from the result of PVOL spreadsheet.

TOTAL (F7) : The sum of TIME,STOR, and PVOL.

Alternative : There are two alternatives to assist to evaluate PDIF. The users can use either one of them. In either one alternative, users should select ratings by type "xxxx" under each selected value. The selected rating values are overridable in the purple cells.

Rating : After considering the ratings in the selected alternative, the users can choose the rating value from the scale list by typing "xxxx" under the selected rate The selected rating values are overridable in the purple cells.

The buffer values of the scales of PDIF are listed as follows.

	Extra Low	Very Low	Low	Nominal	High	Very High	Extra High
PDIF	-----	-----	0.87	1.00	1.29	1.81	2.61

PDIF Eval

TIME

Type : Reference Effort Multiplier

TIME helps to evaluate PDIF Early Design Model.

Rating : After evaluating TIME by its feature, the users should select the rating by type "xxxx" under the selected value. The selected rating value is overridable in the purple cell.

TIME (B11) : It is linked from G9. This value is linked to be presented in EarlyDsgn spreadsheet.

STOR

Type : Reference Effort Multiplier

STOR helps to evaluate PDIF Early Design Model.

Rating : After evaluating STOR by its feature, the users should select the rating by type "xxxx" under the selected value. The selected rating value is overridable in the purple cell.

STOR (B23) : It is linked from G21. This value is linked to be presented in EarlyDsgn spreadsheet.

PVOL

Type : Reference Effort Multiplier

PVOL helps to evaluate PDIF Early Design Model.

Rating : After evaluating PVOL by its feature, the users should select the rating by type "xxxx" under the selected value. The selected rating value is overridable in the purple cell.

PVOL (B38) : It is linked from G36. This value is linked to be presented in EarlyDsgn spreadsheet.

GROUP OF PERSONNEL EXPERIENCES

It is mainly evaluated by PREX. PREX can be evaluated by APEX, PLEX, and LTEX.

PREX

Type : Effort Multiplier.

PREX is the effort multiplier for evaluating platform difficulty. It could be evaluated by APEX, PLEX, and LTEX.

PREX spreadsheet contains PREX features and the its evaluation rates.

APEX (B7): It is linked from the result of APEX spreadsheet.

PLEX (C7): It is linked from the result of PLEX spreadsheet.

LTEX (D7) : It is linked from the result of LTEX spreadsheet.

TOTAL (F7) : The sum of APEX, PLEX, and LTEX.

Alternative : There are two alternatives to assist to evaluate PREX. The users can use either one of them. In either one alternative, users should select ratings by type "xxxx" under each selected value. The selected rating values are overridable in the purple cells.

Rating : After considering the ratings in the selected alternative, the users can choose the rating value from the scale list by typing "xxxx" under the selected rate. The selected rating values are overridable in the purple cells.

The buffer values of the scales of PREX are listed as follows.

	Extra Low	Very Low	Low	Nominal	High	Very High	Extra High
PREX	1.59	1.33	1.12	1.00	0.87	0.74	0.62

PREX Eval

APEX

Type : Reference Effort Multiplier

APEX helps to evaluate PREX Early Design Model.

Rating : After evaluating APEX by its feature, the users should select the rating by type "xxxx" under the selected value. The selected rating value is overridable in the purple cell.

APEX (B12) : It is linked from G10. This value is linked to be presented in EarlyDsgn spreadsheet.

PLEX

Type : Reference Effort Multiplier

PLEX helps to evaluate PREX Early Design Model.

Rating : After evaluating PLEX by its feature, the users should select the rating by type "xxxx" under the selected value. The selected rating value is overridable in the purple cell.

PLEX (B24) : It is linked from G22. This value is linked to be presented in EarlyDsgn spreadsheet.

LTEX

Type : Reference Effort Multiplier

LTEX helps to evaluate PREX Early Design Model.

Rating : After evaluating LTEX by its feature, the users should select the rating by type "xxxx" under the selected value. The selected rating value is overridable in the purple cell.

LTEX (B36) : It is linked from G34. This value is linked to be presented in EarlyDsgn spreadsheet.

GROUP OF FACILITIES

It is mainly evaluated by FCIL. FCIL can be evaluated by TOOL, and SITE.

FCIL

Type : Effort Multiplier.

FCIL is the effort multiplier for evaluating platform difficulty. It could be evaluated by TOOL, and SITE.

FCIL spreadsheet contains FCIL features and the its evaluation rates.

TOOL (B7): It is linked from the result of TOOL spreadsheet.

SITE (C7): It is linked from the result of SITE spreadsheet.

TOTAL (F7) : The sum of TOOL and SITE.

Alternative : There are two alternatives to assist to evaluate FCIL. The users can use either one of them. In either one alternative, users should select ratings by type "xxxx" under each selected value. The selected rating values are overridable in the purple cells.

Rating : After considering the ratings in the selected alternative, the users can choose the rating value from the scale list by typing "xxxx" under the selected rate. The selected rating values are overridable in the purple cells.

The buffer values of the scales of FCIL are listed as follows.

	Extra Low	Very Low	Low	Nominal	High	Very High	Extra High
FCIL	1.43	1.30	1.10	1.00	0.87	0.73	0.62

FCIL Eval

TOOL

Type : Reference Effort Multiplier

TOOL helps to evaluate FCIL Early Design Model.

Rating : After evaluating TOOL by its feature, the users should select the rating by type "xxxx" under the selected value. The selected rating value is overridable in the purple cell.

TOOL (B14) : It is linked from G12. This value is linked to be presented in EarlyDsgn spreadsheet.

SITE

Type : Reference Effort Multiplier

SITE helps to evaluate FCIL Early Design Model.

Rating : After evaluating SITE by its feature, the users should select the rating by type "xxxx" under the selected value. The selected rating value is overridable in the purple cell.

SITE (B30) : It is linked from G28. This value is linked to be presented in EarlyDsgn spreadsheet.

GROUP OF SCHEDULE

It is mainly evaluated by SCED.

SCED

Type : Effort Multiplier.

SCED spreadsheet contains SCED features and the its evaluation rates.

Evaluation : At the orange areas, the users can evaluate the SCED by its features. Then, the users select the rating values by typing "xxxx" under the selected rating. The values would be presented at G6, G7, H13, and H14. This value at H14 is also linked to Reference Section at the first spreadsheet in this spreadsheet tool.

Rating : The users can choose the rating value from the scale list by typing "xxxx" under the selected rate. The selected rating values are overridable in the purple cells.

The buffer values of the scales of SCED are listed as follows.

	Extra Low	Very Low	Low	Nominal	High	Very High	Extra High
SCED	-----	1.43	1.14	1.00	1.00	1.00	-----

II. The Relationship Of The Spreadsheets

