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QUALITY FACTOR MODULES - COMPUTER SYSTEMS
ACQUISITION METRICS. VOLUME II

Systems Architects, Inc.
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May 1982

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ELECTRONIC SYSTEMS DIVISION
AIR FORCE SYSTEMS COMMAND
DEPUTY FOR TECHNICAL OPERATIONS AND
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HANSCOM AIR FORCE BASE, MASSACHUSETTS 01731



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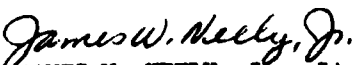
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REVIEW AND APPROVAL

This technical report has been reviewed and is approved for publication.


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QUALITY FACTOR

MODULE NO. 1

CORRECTNESS

TABLE OF CONTENTS

<u>TITLE</u>	<u>PAGE</u>
<u>INTRODUCTION AND INSTRUCTIONS FOR CORRECTNESS MODULE</u>	
INTRODUCTION TO CORRECTNESS.	Co-1
STEPS FOR COMPLETING WORKSHEETS	Co-5
STEPS FOR UPDATE APPLICATIONS	Co-8
HOW TO USE SCORE CHART SETS	Co-9
ESD PRODUCTS FOR ANALYSIS PHASE.	Co-12
ESD PRODUCTS FOR DESIGN PHASE	Co-13
ESD PRODUCTS FOR CODING AND CHECKING PHASE. .	Co-14
ESD PRODUCTS FOR TEST AND INTEGRATION PHASE .	Co-15
 <u>QUALITY FACTOR NO. 1 CORRECTNESS WORKSHEETS</u>	
WORKSHEETS FOR REQUIREMENTS ANALYSIS PHASE. .	Co-16
WORKSHEETS FOR PRELIMINARY DESIGN PHASE . . .	Co-20
WORKSHEETS FOR DETAIL DESIGN PHASE.	Co-32
WORKSHEETS FOR IMPLEMENTATION PHASE	Co-42

This QUALITY FACTOR MODULE is one of a set of eleven modules that are components of the "COMPUTER SYSTEMS ACQUISITION METRICS HANDBOOK".



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INTRODUCTION AND INSTRUCTIONS
FOR
CORRECTNESS MODULE

INTRODUCTION TO CORRECTNESS

The Quality Factor Correctness represents a measure of the extent to which a program satisfies its specifications and fulfills the user's mission objectives. FIGURES Co - 1 through Co - 4 represent the hierarchy of Metric, Criteria and Quality Factor worksheets associated with Correctness in Requirements Analysis, Preliminary Design, Detailed Design and Implementation phases of the Software Development Life Cycle.

The worksheets in this module are grouped into four separate sets, one set for each Life Cycle phase. Each set consists of Metric worksheets, Criteria worksheets, a Factor worksheet and score charts.

METRIC WORKSHEETS

One or more DATA COLLECTION WORKSECTIONS which contain the data element scores for each Metric, and each Metric's Final Score.

CRITERIA WORKSHEETS

One or more METRIC SUMMARY WORKSECTIONS which contain the Metrics scores for each Criteria, and each Criteria's Final Score.

FACTOR WORKSHEETS

One CRITERIA SUMMARY WORKSECTION which contains each Criteria's score, and the Final Score for the Factor for that phase.

SCORE CHARTS:

One or more charts that record worksheet values throughout the Life Cycle.

However, the sequence in which the worksheet sets are applied is dependent on the availability of ESD Computer Program Life Cycle products. Usually the worksheets will be applied sequentially, except for updates.

These instructions show when the Correctness worksheet sets and Score Charts are applied during the Computer Program Life Cycle. The Product Code referred to on the Score Charts is the code defined in the ESD Guidebook Series, Software Acquisition Management Guidebook, Life Cycle Events and reillustrated in the General Instructions. The Product Tables map the ESD Computer Program Life Cycle Products to the Metric Worksheets. The balance of these instructions are step-by-step procedures for completing the worksheets and score chart summaries.

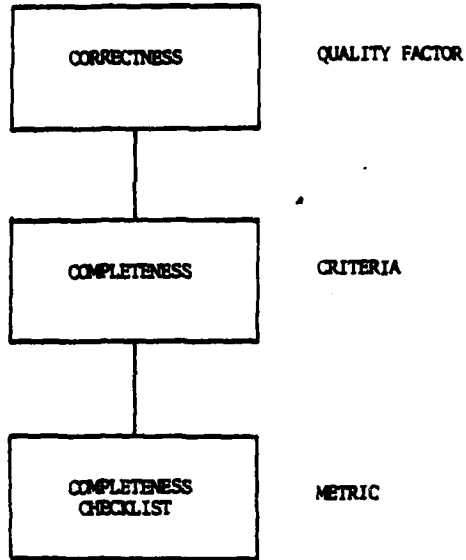


FIGURE Co-1
REQUIREMENTS ANALYSIS WORKSHEET HIERARCHY

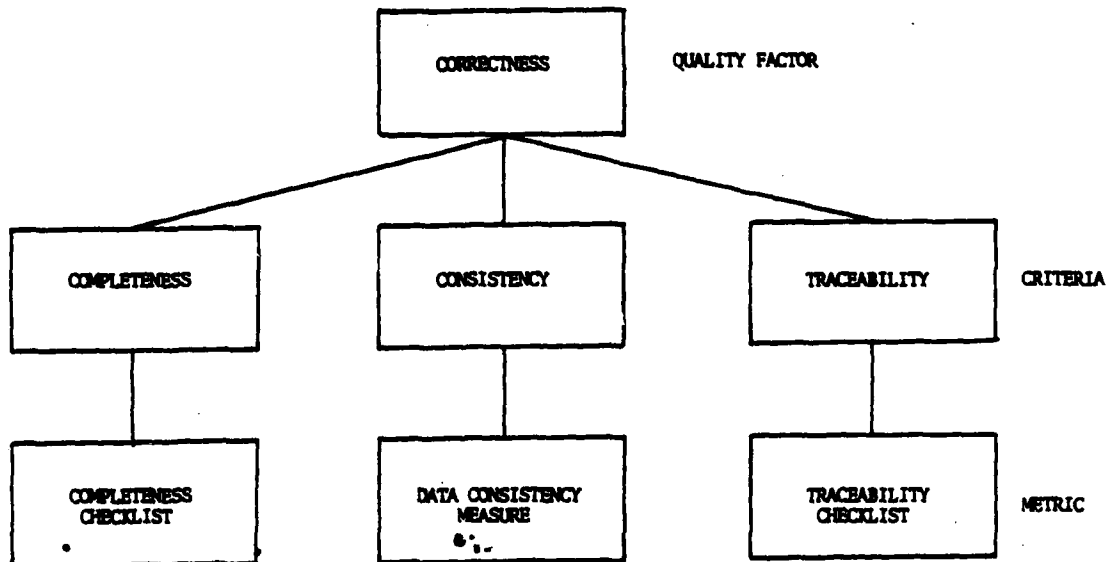


FIGURE Co-2
PRELIMINARY DESIGN WORKSHEET HIERARCHY

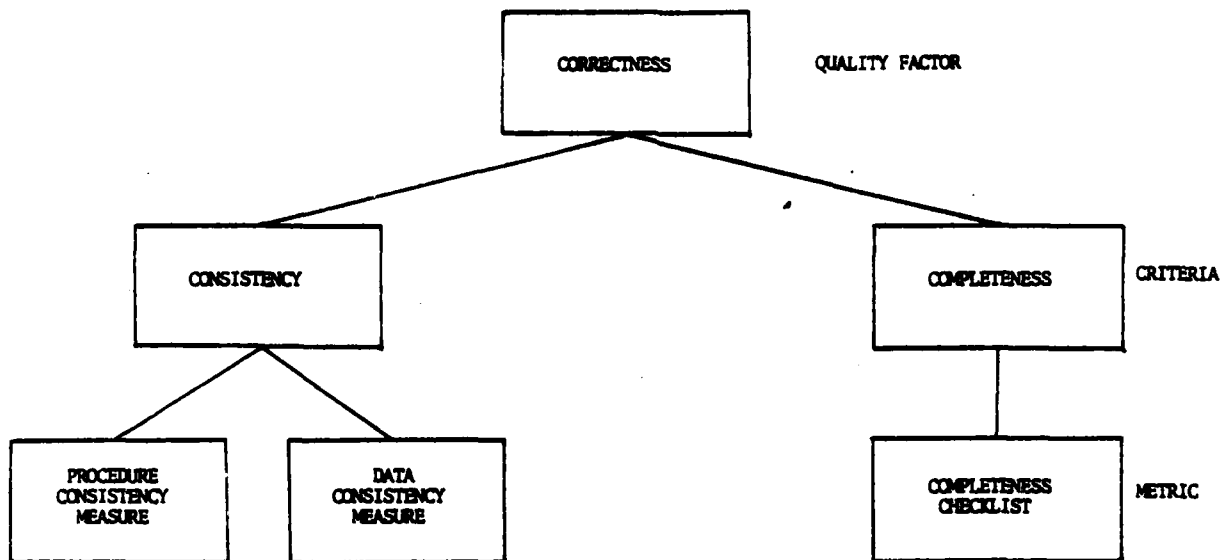


FIGURE Co-3.
DETAILED DESIGN WORKSHEET HIERARCHY

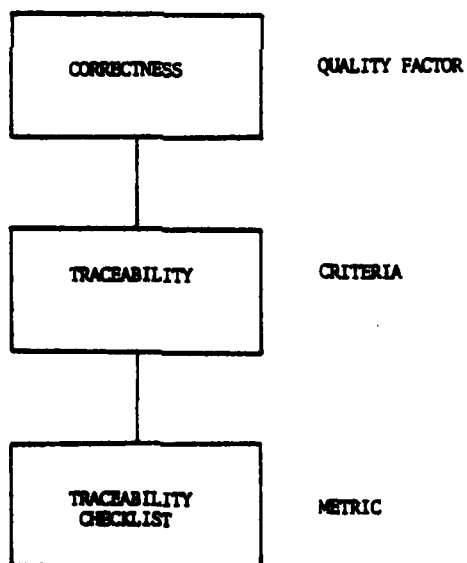


FIGURE Co-4
IMPLEMENTATION WORKSHEET HIERARCHY

STEPS FOR COMPLETING WORKSHEETS

Step 1

Enter the appropriate information in the following blocks:

- (1.1) SYSTEM/SUBSYSTEM/MODULE block-Indicate the level of application.
- (1.2) NAME block-List the name of the system being measured.
- (1.3) SOURCE block-On Metric Worksheets, list the source document.
- (1.4) The PREPARED BY and DATE blocks should contain the name of the person performing the software metrics, and the current date.

Step 2

Determine the current Computer Program Life Cycle Phase. This module is concerned with four phases of the Computer Program Life Cycle:

- (2.1) Requirements Analysis
- (2.2) Preliminary Design
- (2.3) Detail Design
- (2.4) Implementation

Step 3

Determine the available products from the phase and which data worksheet set to apply. Each Life Cycle phase has at least three different activities associated with it. The result of the completion of an activity is one or more documents called products.

Before a worksheet set can be applied, specific products associated with it must be obtained. The Product Tables, at the end of the instructions, detail the products required for each worksheet set.

Step 4 - METRIC WORKSHEETS

- (4.1) Answer each question in the Data Collection Worksection as it applies to the system/subsystem/module you are measuring and transfer its scored value to its corresponding SCORE block.

If the question calls for a YES/NO type response, a YES answer is scored at a 1.
a NO answer is scored as a 0.

The questions that call for a numeric quantity type response have specific instructions on how to score the response. Follow the instructions under each data element.

- (4.2) Find the Metric Value by following the algorithm on the worksheet.
- (4.3) Answer the Evaluation Worksection - evaluate the products based on the data elements as they apply to the system.
- (4.4) When you have repeated this procedure for all the Metric Worksheets in the set, you are ready to use the Criteria Worksheets.

Step 5 - CRITERIA WORKSHEETS

- (5.1) Each numbered item in the Metric Summary Worksection represents an individual Metric Value.

- (5.2) Find the Form Code in the SOURCE box of the Criteria Worksheet.
- (5.3) Find the Metric Worksheet with the same Form Code and transfer its Metric Value into the box to the right of the item in the Criteria Worksheet.
- (5.4) Repeat this process for all items in the Metric Summary Worksection.
- (5.5) Find the Criteria Value by following the algorithm on the worksheet.
- (5.6) Answer the Evaluation Worksection - evaluate the products based on the Metrics as they apply to the system.

Step 6 - FACTOR WORKSHEETS

- (6.1) Each numbered item in the Criteria Summary Worksection represents an individual Criterion Value.
- (6.2) Find the Form Code in the SOURCE box of the Factor Worksheet.
- (6.3) Find the Criteria Worksheet with the same Form Code and transfer its Criteria Value into the box in the Score column in the Factor Worksheet.
- (6.4) Repeat this process for all items in the Criteria Summary Worksection.
- (6.5) Answer the Evaluation Worksection - evaluate the products based on the Criteria as they apply to the system.
- (6.6) Find the Factor Value by following the algorithm on the Worksheet.

STEPS FOR UPDATE APPLICATIONS

Step 1

Determine the update necessary. The Product Tables at the end of these instructions list the updates required and the activities and products associated with each update. Also review Section 2.3.2, "Update Information Requirements", in the General Instructions Handbook for further information if necessary.

Step 2

Obtain the required products. The Products Tables at the end of these Instructions list the products required for each update application.

Step 3

Reapply the Metric, Criteria, and Factor worksheets by following the procedure already outlined in "Steps for Completing Worksheets", of these Instructions. "How to Use Score Chart sets", explains the procedure for reporting the update scores.

HOW TO USE SCORE CHART SET

When you apply worksheets to system/subsystem/module, you must apply some worksheets more than once in the Computer Program Life Cycle. Because of this, a Score Chart set is organized so that the groups of worksheet scores, acquired at the times a set of worksheets is applied, can be recorded separately: originals & updates.

The Score Chart set (at the end of each worksheet set) is composed of similar tree structure diagrams. Each Score Chart represents the complete hierarchy of scores to be acquired during any one application of worksheets sets in the Life Cycle.

When applying any worksheet, in order to record scores you must locate and use the Score Chart that corresponds to the current phase in the Life Cycle. In a Score Chart set, the first Score Chart (labeled FIRST MEASUREMENT) is designed to receive the scores from the first application of a worksheet set in the Life Cycle, and the following charts (i.e., labeled SECOND MEASUREMENT, etc.) are designed to receive the scores from the updates.

Each data element in the Metrics Worksheet has a unique number in the Data Element Dictionary, which is listed in the first column in the Score Chart. The next two columns of boxes in a Score Chart show a worksheet set's individual data element raw scores and its interpreted response (Yes/No, = 1 or 0, etc.). The last three box columns map out the Metric, Criteria and Factor worksheets of a set, each box representing the total score of a corresponding worksheet.

Once you have finished scoring a Worksheet set and located the corresponding Score Chart set, use the following procedure for filling out the Score Chart:

Step 1 - ANSWER OF DATA ELEMENT/DATA ELEMENT SCORE

For each data element in a Metric Worksheet:

- (1.1) Reference its number in the "Data Element Number" Column in the Score Chart.
- (1.2) Transfer the answers you gave to the questions in the Data Collection Worksection to the corresponding box under the column headed "Answer of Data Element"
- (1.3) Transfer the Scores of the data element from the Data Collection Worksection to its corresponding box under column labeled "Data Element Score".
- (1.4) Repeat this step for all data elements within this phase.

Step 2 - METRIC SCORE

Each box in this column represents the Score from the Metric Worksection of a Metric Worksheet. Transfer the Metric Value from each Metric Worksheet into the corresponding boxes in the Score Chart's Metric Score Column.

Step 3 - CRITERIA SCORE

Each box in this column represents the score from the Criteria Worksection of a Criteria Worksheet into the corresponding boxes of the Score Chart's Criteria Score Column.

Step 4 - FACTOR SCORE

Each box in this column represents the score from the Factor Worksection of a Quality Factor Worksheet. Transfer the Factor from the set's Factor Worksheet into corresponding boxes of the Score Chart's Factor Score Column.

These Score Chart sets will provide a historical base for repeated application of the metrics to a system at all levels. They are also a useful means of reporting your finds to the program manager in a condensed and compact form.

PRODUCTS	TRADE-OFF STUDY REPORTS	INITIAL OR AUTHENTICATED SYSTEM SPEC, SEGMENT SPEC	AUTHENTICATED DEVELOPMENT SPEC FOR CPCI	HIGHER LEVEL SPEC	DRAFT PRODUCT SPECS	PDR MINUTES AND ACTION ITEM RESPONSES
WORKSHEET SET TO BE APPLIED	REQUIREMENTS ANALYSIS WORKSHEETS				PRELIMINARY DESIGN WORKSHEETS	

ESD PRODUCTS FOR ANALYSIS PHASE

Apply the Requirement Analysis Worksheets as the following types of products become available. See note below.

- Product A.1 - Trade-off Study Reports
- Product A.2 - Initial or Authenticated System Specification & Segment Specification (if any)
- Product B.1 - Authenticated Development Specification for each CPCI
- Product B.2 - Possible higher-level specification, ICD and changes

Apply the Preliminary Design Worksheets as the following types of products become available. See note below.

- Product B.3 - Parts of draft Product Specifications containing design approaches for each CPCI
- Product C. - PDR minutes and action item responses

NOTE: If these products do not contain the information requested by the Data Element questions, other contractor-supplied information should be searched.

PRODUCTS	FUNCTIONAL FLOW CHARTS	DE- TAILED FLOW CHART	DATA FORMAT DESC.	ALGO- RITHM DESC.	PRELIMI- NARY PRODUCT DESC.	CDR MINUTES ACTION ITEM RESPON- SES	SYSTEM SEG- MENT TEST PLANS	PRELIM. CPCI TEST PRO- CEDURES
WORKSHEET SET TO BE APPLIED	DETAILED DESIGN WORKSHEETS						PRELIMINARY DESIGN WORKSHEETS, (UPDATE)	

ESD PRODUCTS FOR DESIGN PHASE

Apply the Detailed Design Worksheets as the following types of products become available. See note below.

- Product A.1: Functional flowcharts
- Product A.2: Detailed flowcharts
- Product A.3: Data format descriptions
- Product A.4: Descriptions of algorithms not previously prescribed
- Product B. : Preliminary Product Specifications, including the above
- Product D. : CDR minutes & action item responses

Apply the Preliminary Design Worksheets for Update as the following types of products become available. See note.

- Product C.1: System, Segment and CPCI Test Plans
- Product C.2: Preliminary CPCI Test Procedures

NOTE: If these products do not contain the information requested by the Data Element questions, other contractor-supplied information should be searched.

PRODUCTS	CODE	ALTERED PRODUCT SPECS
WORKSHEET SET TO BE APPLIED	IMPLEMENTATION WORKSHEETS	DETAILED DESIGN WORKSHEETS (UPDATE)

ESD PRODUCTS FOR CODING AND CHECKING PHASE

Apply the Implementation Worksheets as the code becomes available.

Apply the Detailed Design Worksheets for Update as the following types of products become available. See note below.

- Product C. - Altered Product Specifications, including compiler/assembly listings.

NOTE: If these products do not contain the information requested by the Data Element questions, other contractor-supplied information should be searched.

PRODUCTS	FINAL CPCI TEST PROCEDURES	SEGMENT & SYSTEM LEVEL TEST PROCEDURES	TEST REPORTS	CODING CHANGES	MODIFIED PRODUCT SPECS	HIGH LEVEL SPECS
WORKSHEET SET TO BE APPLIED	PRELIMINARY DESIGN WORKSHEETS			IMPLEMEN- TATION WORKSHEETS	DETAILED DESIGN WORKSHEETS (UPDATE)	

ESD PRODUCTS FOR TEST AND
INTEGRATION PHASE

Apply the Preliminary Design Worksheets for Update as the following types of products become available. See note below.

- ^A Product 1: Final CPCI Test Procedures
- Product 2: Segment (if any) and system-level Test Procedures

- ^{B-D} Product 1: Test Reports

Apply the Implementation Worksheets for Update as the following types of products become available. See note below.

- ^{B-D} Product 2: Computer Program Coding Changes

Apply the Detailed Design Worksheets for Update as the following types of products become available. See note.

- ^{B-D} Product 3: Modified Product Specification
- Product 4: Possible high-level specification, ICD and changes.

NOTE: If these products do not contain the information requested by the Data Element questions, other contractor-supplied information should be searched.

COMPLETENESS CHECKLIST

Form Code: CoRAM.1

LIFE CYCLE PHASE:

REQUIREMENTS ANALYSIS

SOURCE(S):

- ☐ SYSTEM
☐ SUBSYSTEM
☐ MODULE

NAME: _____

I. DATA COLLECTION WORKSECTION:

SCORE

1.0 Unambiguous References (2)

1.1 Are requirements itemized so that the various functions to be performed, their inputs and outputs, are clearly delineated?

Y N

Yes = 1, No = 0

☐

2.0 External Data Reference (3)

2.1 Number of data references which are defined.

☐

2.2 Number of major data references.

☐

Score = +

☐

3.0 Major Functions Used (4)

3.1 Number of defined functions used.

☐

3.2 Number of functions identified.

☐

Score = +

☐

4.0 Major Functions Defined (5)

4.1 Number of identified functions defined.

☐

4.2 Number of functions identified.

☐

Score = +

☐

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

COMPLETENESS CHECKLIST

Form Code: CoRAM.1

LIFE CYCLE PHASE:

REQUIREMENT ANALYSIS

SOURCE(S):

☐ SYSTEM

NAME: _____

☐ SUBSYSTEM

☐ MODULE

I. DATA COLLECTION WORKSECTION (continued):

SCORE

5.0 Decision Points Defined (6)

5.1 Is the flow of processing and all decision points in that flow defined? ☐ Y ☐ N

Yes = 1, No = 0

6.0 Agreement of Calling Sequence Parameters (7)

6.1 Number of defined and referenced calling sequence parameters that agree between functions. ☐

6.2 Number of calling sequence parameters. ☐

Score = ☐ 6.1 + ☐ 6.2

7.0 Problem Reports Resolved (8)

7.1 Number of those problem reports that have been closed (resolved). ☐

7.2 Number of problem reports related to the requirements that have been reported. ☐

Score = ☐ 7.1 + ☐ 7.2

II. METRIC WORKSECTION:

Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the data elements above? (1-10) (If you are unable to evaluate)

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

<u>COMPLETENESS</u>			Form Code: <u>CoRAC.1</u>
LIFE CYCLE PHASE:		SOURCE(S): <u>CoRAM.1</u>	
☐ SYSTEM ☐ SUBSYSTEM ☐ MODULE	NAME: _____ _____ _____		
I. <u>METRIC SUMMARY WORKSECTION:</u> 1. Completeness Checklist			SCORE ☐
II. <u>CRITERIA WORKSECTION:</u> Criteria Value $\frac{\text{Sum of Above Scores}}{\text{No. of Metrics}}$			☐
III. <u>EVALUATION WORKSECTION:</u> What is your evaluation of the reviewed products based on the metrics above? (1-10) _____ (Ø If you are unable to evaluate)			

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

<u>CORRECTNESS</u>		
LIFE CYCLE PHASE: REQUIREMENTS ANALYSIS		Form Code: <u>CoRAF.1</u>
SOURCE(S): <u>CoRAC.1</u>		
☐ SYSTEM ☐ SUBSYSTEM ☐ MODULE	NAME: _____ _____ _____	
I. <u>CRITERIA SUMMARY WORKSECTION:</u> 1. Completeness		SCORE ☐
II. <u>FACTOR WORKSECTION:</u> $\text{Factor Value} = \frac{\text{Sum of Above Scores}}{\text{No. of Criteria}}$		☐
III. <u>EVALUATION WORKSECTION:</u> What is your evaluation of the reviewed products based on the criteria above? (1-10) _____ (§ If you are unable to evaluate)		

PREPARED BY: _____ APPROVED BY: _____
 DATE: _____ DATE: _____

COMPLETENESS CHECKLIST

Form Code: CoPDM.1

LIFE CYCLE PHASE:
PRELIMINARY DESIGN

SOURCE(S):

- ☐ SYSTEM
☐ SUBSYSTEM
☐ MODULE

NAME: _____

I. DATA COLLECTION WORKSECTION:

SCORE

1.0 Unambiguous References (2)

1.1 Are requirements itemized so that the various functions to be performed, their inputs and outputs, are clearly delineated?

☐ Y ☐ N

Yes = 1, No = 0

☐

2.0 External Data Reference (3)

2.1 Number of data references which are defined.

☐

2.2 Number of major data references.

☐

Score = ☐ 2.1 + ☐ 2.2

☐

3.0 Major Functions Used (4)

3.1 Number of defined functions used.

☐

3.2 Number of functions identified.

☐

Score = ☐ 3.1 + ☐ 3.2

☐

4.0 Major Functions Defined (5)

4.1 Number of identified functions defined.

☐

4.2 Number of functions identified.

☐

Score = ☐ 4.1 + ☐ 4.2

☐

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

COMPLETENESS CHECKLIST

Form Code: CoPDM.1

LIFE CYCLE PHASE:

SOURCE(S):

PRELIMINARY DESIGN

- ☐ SYSTEM
☐ SUBSYSTEM
☐ MODULE

NAME: _____

I. DATA COLLECTION WORKSECTION (continued):

SCORE

5.0 Decision Points Defined (6)

5.1 Is the flow of processing and all decision points in that flow defined? YN

Yes = 1, No = 0

6.0 Agreement of Calling Sequence Parameters (7)

6.1 Number of defined and referenced calling sequence parameters that agree between functions.

6.2 Number of calling sequence parameters.

Score = 6.1 + 6.2

7.0 Problem Reports Resolved (8)

7.1 Number of those problem reports that have been closed (resolved).

7.2 Number of problem reports related to the requirements that have been reported.

Score = 7.1 + 7.2

II. METRIC WORKSECTION:

Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the data elements above?
 (1-10) _____ (Ø If you are unable to evaluate)

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

TRACEABILITY CHECKLIST

Form Code: CoPDM.2

LIFE CYCLE PHASE: PRELIMINARY DESIGN		SOURCE(S): _____ _____ _____	
☐ SYSTEM	NAME: _____		
☐ SUBSYSTEM	_____		
☐ MODULE	_____		

I. <u>DATA COLLECTION WORKSECTION:</u>	SCORE
1.0 <u>Cross Reference (traceability) (29)</u> 1.1 Is there a matrix relating itemized requirements to modules which implement these requirements. ☐ Y ☐ N Yes = 1, No = 0	☐
II. <u>METRIC WORKSECTION:</u> $\text{Metric Value} = \frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$	☐
III. <u>EVALUATION WORKSECTION:</u> What is your evaluation of the reviewed products based on the data elements above? (1-10) _____ (Ø If you are unable to evaluate)	
IV. <u>INSPECTOR'S COMMENTS:</u> 	

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

DATA CONSISTENCY MEASURE

Form Code: CoPDM.3

LIFE CYCLE PHASE:

PRELIMINARY DESIGN

SOURCE(S):

- ☐ SYSTEM
☐ SUBSYSTEM
☐ MODULE

NAME: _____

I. DATA COLLECTION WORKSECTION:

SCORE

1.0 Global Data (42)

1.1 On this level, is global data
defined only once?

☐ Y ☐ N

Yes = 1, No = 0

☐

2.0 Standard Data Usage Representation (144)

2.1 Is standard design representation
for data usage established?

☐ Y ☐ N

Yes = 1, No = 0

☐

II. METRIC WORKSECTION:

Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the
reviewed products based on the data elements above?
(1-10) _____ (Ø If you are unable to evaluate)

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

COMPLETENESS

Form Code: CoPDC.1

LIFE CYCLE PHASE:

PRELIMINARY DESIGN

SOURCE(S):

CoPDM.1

☐

SYSTEM

NAME: _____

☐

SUBSYSTEM

☐

MODULE

I. METRIC SUMMARY WORKSECTION:

1. Completeness Checklist

SCORE

☐

II. CRITERIA WORKSECTION:

Criteria Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Metrics}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the metrics above?
(1-10) _____ (Ø If you are unable to evaluate)

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

TRACEABILITY

Form Code: CoPDC.2

LIFE CYCLE PHASE:

PRELIMINARY DESIGN

SOURCE(S):

CoPDM.2

☐

SYSTEM

NAME: _____

☐

SUBSYSTEM

☐

MODULE

I. METRIC SUMMARY WORKSECTION:

1. Traceability Checklist

SCORE

☐

II. CRITERIA WORKSECTION:

Criteria Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Metrics}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the metrics above?
(1-10) _____ (Ø If you are unable to evaluate)

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

CONSISTENCY

Form Code: CoPDC.3

LIFE CYCLE PHASE:

PRELIMINARY DESIGN

SOURCE(S):

CoPDM.3

☐

SYSTEM

NAME: _____

☐

SUBSYSTEM

☐

MODULE

I. METRIC SUMMARY WORKSECTION:

1. Data Consistency Measure

SCORE

☐

II. CRITERIA WORKSECTION:

Criteria Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Metrics}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the metrics above?
(1-10)____ (0 If you are unable to evaluate)

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

CORRECTNESS

Form Code: CoPDF.1

LIFE CYCLE PHASE:

PRELIMINARY DESIGN

SOURCE(S):

CoPDM.2 CoPDM.3

☐

SYSTEM

NAME: _____

☐

SUBSYSTEM

☐

MODULE

CoPDM.1

I. CRITERIA SUMMARY WORKSECTION:

1. Traceability
2. Consistency
3. Completeness

SCORE

II. FACTOR WORKSECTION:

Factor Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Criteria}}$

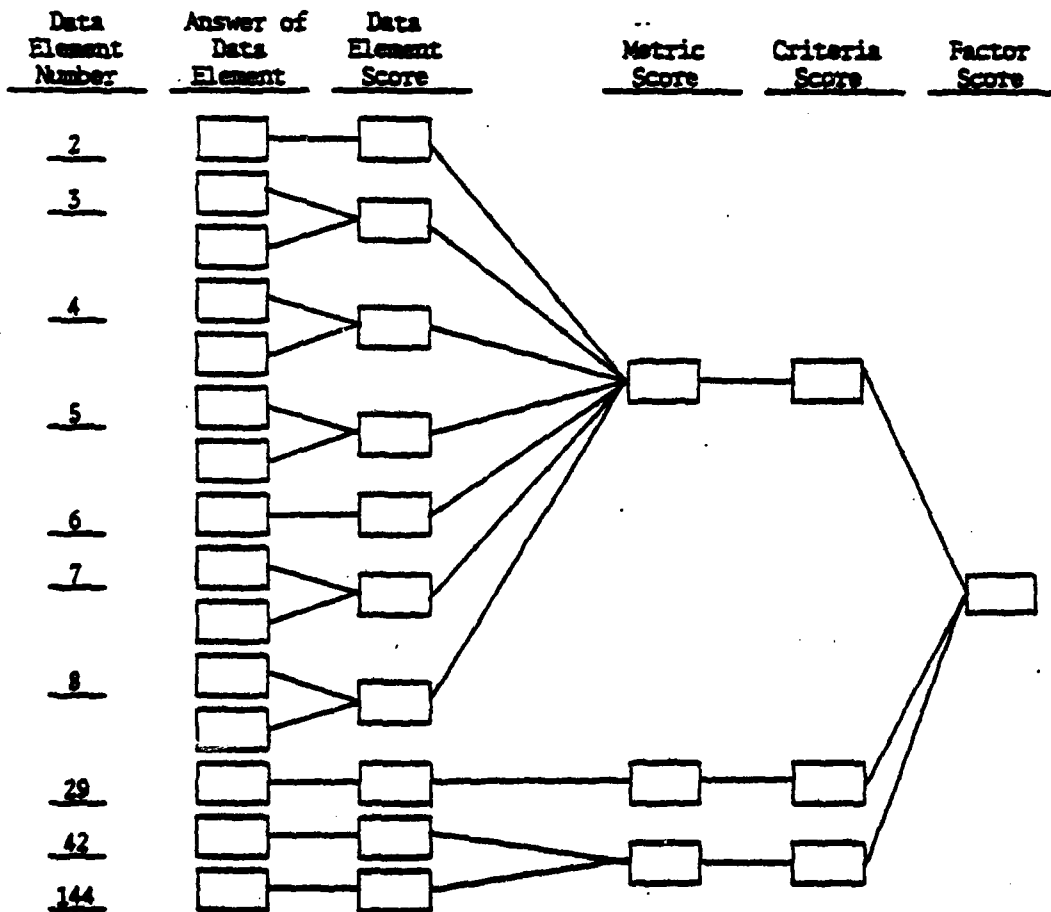
III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the criteria above?
(1-10) _____ (# If you are unable to evaluate)

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

CORRECTNESS

Complete this score chart if an application of this set of worksheets is appropriate when products of B3 and C in Analysis Phase become available.



FIRST MEASUREMENT

Date _____

CORRECTNESS

Complete this score chart if application of this set of worksheets is appropriate for update when products of C1 and C2 in Design Phase are available.

<u>Data Element Number</u>	<u>Answer of Data Element</u>	<u>Data Element Score</u>	<u>Metric Score</u>	<u>Criteria Score</u>	<u>Factor Score</u>
<u>2</u>					
<u>3</u>					
<u>4</u>					
<u>5</u>					
<u>6</u>					
<u>7</u>					
<u>8</u>					
<u>29</u>					
<u>42</u>					
<u>144</u>					

SECOND MEASUREMENT

Date _____

CORRECTNESS

Complete this score chart if application of this set of worksheet is appropriate for update when products of A1, A2 and B-D1 in Test and Integration Phase are available.

<u>Data Element Number</u>	<u>Answer of Data Element</u>	<u>Data Element Score</u>	<u>Metric Score</u>	<u>Criteria Score</u>	<u>Factor Score</u>
<u>2</u>					
<u>3</u>					
<u>4</u>					
<u>5</u>					
<u>6</u>					
<u>7</u>					
<u>8</u>					
<u>29</u>					
<u>42</u>					
<u>144</u>					

THIRD MEASUREMENT

Date _____

CORRECTNESS

Complete this score chart if application of this set of worksheets is appropriate for update when products of A1, A2 and B-D1 in Test and Integration Phase are available.

<u>Data Element Number</u>	<u>Answer of Data Element</u>	<u>Data Element Score</u>	<u>Metric Score</u>	<u>Criteria Score</u>	<u>Factor Score</u>
<u>2</u>					
<u>3</u>					
<u>4</u>					
<u>5</u>					
<u>6</u>					
<u>7</u>					
<u>8</u>					
<u>29</u>					
<u>42</u>					
<u>144</u>					

FOURTH MEASUREMENT

Date _____

PROCEDURE CONSISTENCY MEASURE

Form Code: CoDDM.1

LIFE CYCLE PHASE:
DETAIL DESIGN

SOURCE(S):

- ☐ SYSTEM
☐ SUBSYSTEM
☐ MODULE

NAME: _____

I. DATA COLLECTION WORKSECTION:

SCORE

1.0 Standard Design Representation (101)

1.1 Does the design representation
comply with established standards?

☐ Y ☐ N

Yes = 1, No = 0

☐

2.0 Input/Output Conventions (102)

2.1 Do input/output references comply
with established standards?

☐ Y ☐ N

Yes = 1, No = 0

☐

3.0 Calling Sequence Conventions (103)

3.1 Do calling sequences comply with
established standards?

☐ Y ☐ N

Yes = 1, No = 0

☐

4.0 Error Handling Conventions (104)

4.1 Is error handling done according
to established standards?

☐ Y ☐ N

Yes = 1, No = 0

☐

II. METRIC WORKSECTION:

Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the
reviewed products based on the data elements above?
(1-10) _____ (Ø If you are unable to evaluate)

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

DATA CONSISTENCY MEASURE

Form Code: CoDDM.2

LIFE CYCLE PHASE:
DETAIL DESIGN

SOURCE(S):

- ☐ SYSTEM
☐ SUBSYSTEM
☐ MODULE

NAME: _____

I. DATA COLLECTION WORKSECTION:

SCORE

1.0 Global Data (42)

1.1 On this level, are global
variables used as defined globally?

☐ Y ☐ N

Yes = 1, No = 0

☐

2.0 Naming Conventions (105)

2.1 Are variables named according
to established standards?

☐ Y ☐ N

Yes = 1, No = 0

☐

II. METRIC WORKSECTION:

Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the
reviewed products based on the data elements above?
(1-10) _____ (0 If you are unable to evaluate)

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

COMPLETENESS CHECKLIST

Form Code: CoDDM.3

LIFE CYCLE PHASE:
DETAIL DESIGN

SOURCE(S):

- ☐ SYSTEM
☐ SUBSYSTEM
☐ MODULE

NAME: _____

I. DATA COLLECTION WORKSECTION:

SCORE

1.0 Unambiguous References (2)

1.1 Are requirements itemized so that the various functions to be performed, their inputs and outputs, are clearly delineated?

Y N

Yes = 1, No = 0

☐

2.0 External Data Reference (3)

2.1 Number of data references which are defined.

☐

2.2 Number of major data references.

☐

Score = ☐ 2.1 + ☐ 2.2

☐

3.0 Major Functions Used (4)

3.1 Number of defined functions used.

☐

3.2 Number of functions identified.

☐

Score = ☐ 3.1 + ☐ 3.2

☐

4.0 Major Functions Defined (5)

4.1 Number of identified functions defined.

☐

4.2 Number of functions identified.

☐

Score = ☐ 4.1 + ☐ 4.2

☐

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

COMPLETENESS CHECKLIST

Form Code: CoDDM.3

LIFE CYCLE PHASE:

SOURCE(S):

DETAIL DESIGN

- ☐ SYSTEM
☐ SUBSYSTEM
☐ MODULE

NAME: _____

I. DATA COLLECTION WORKSECTION (continued):

SCORE

5.0 Decision Points Defined (6)

5.1 Is the flow of processing and all decision points in that flow defined? YN

Yes = 1, No = 0

☐

6.0 Agreement of Calling Sequence Parameters (7)

6.1 Number of defined and referenced calling sequence parameters that agree between functions.

6.2 Number of calling sequence parameters.

Score = 6.1 + 6.2

☐

7.0 Problem Reports Resolved (8)

7.1 Number of those problem reports that have been closed (resolved).

7.2 Number of problem reports related to the requirements that have been reported.

Score = 7.1 + 7.2

☐

II. METRIC WORKSECTION:

Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the data elements above? (1-10) _____ (Ø If you are unable to evaluate)

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

CONSISTENCY

Form Code: CoDDC.1

LIFE CYCLE PHASE:

DETAIL DESIGN

SOURCE(S):

CoDDM.1

☐ SYSTEM

NAME: _____

☐ SUBSYSTEM

CoDDM.2

☐ MODULE

I. METRIC SUMMARY WORKSECTION:

1. Procedure Consistency Measure

2. Data Consistency Measure

SCORE

☐☐

II. CRITERIA WORKSECTION:

Criteria Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Metrics}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the metrics above?
(1-10) _____ (Ø If you are unable to evaluate)

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

<u>COMPLETENESS</u>		
		Form Code: <u>CoDDC.2</u>
LIFE CYCLE PHASE: DETAIL DESIGN		SOURCE(S): <u>CoDDM.3</u>
☐ SYSTEM ☐ SUBSYSTEM ☐ MODULE	NAME: _____ _____ _____	_____ _____ _____
I. <u>METRIC SUMMARY WORKSECTION:</u> 1. Completeness Checklist		SCORE ☐
II. <u>CRITERIA WORKSECTION:</u> Criteria Value $\frac{\text{Sum of Above Scores}}{\text{No. of Metrics}}$		☐
III. <u>EVALUATION WORKSECTION:</u> What is your evaluation of the reviewed products based on the metrics above? (1-10) _____ (Ø If you are unable to evaluate)		

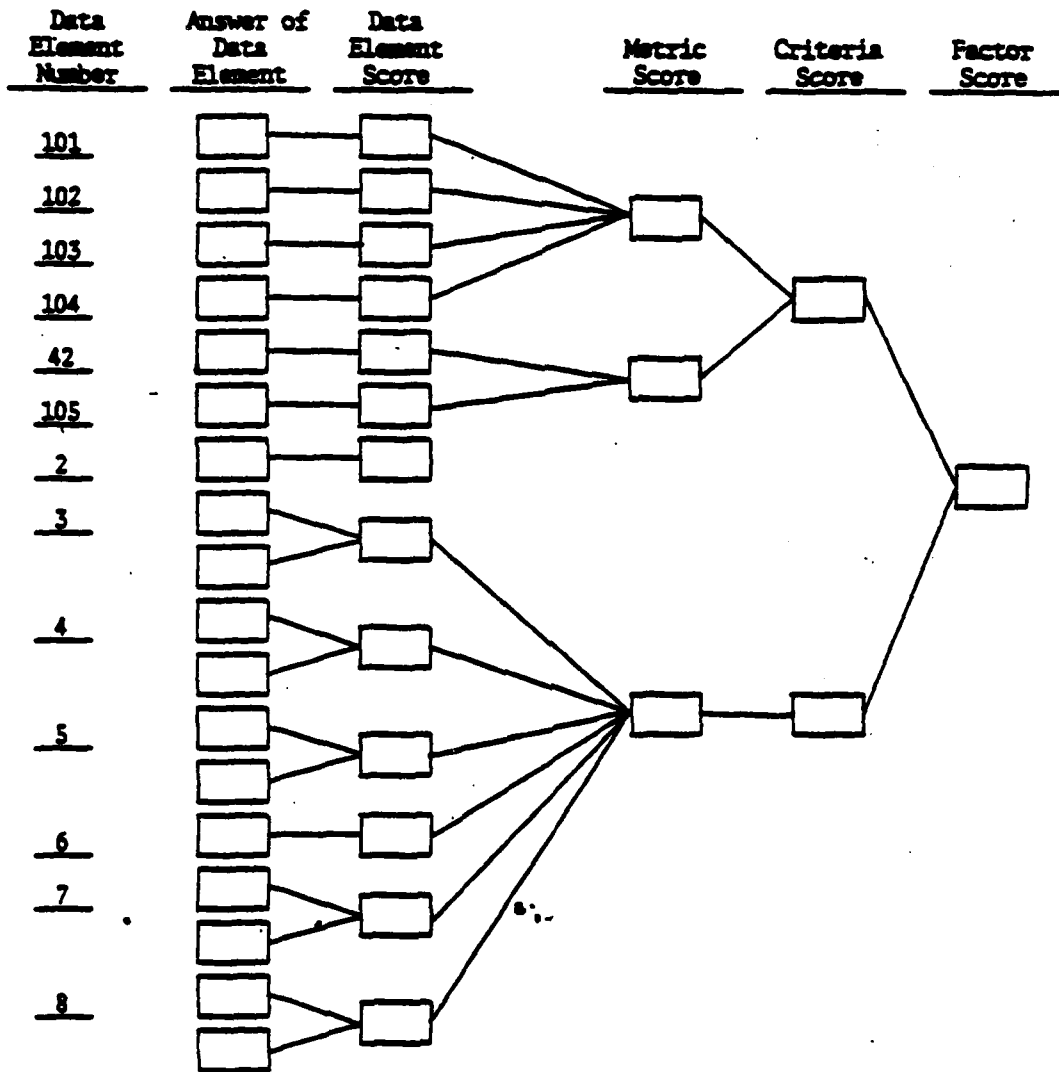
PREPARED BY: _____ APPROVED BY: _____
 DATE: _____ DATE: _____

<u>CORRECTNESS</u>			Form Code: <u>CoDDF.1</u>
LIFE CYCLE PHASE: DETAIL DESIGN		SOURCE(S): <u>CoDDC.1</u> <u>CoDDC.2</u>	
☐ SYSTEM ☐ SUBSYSTEM ☐ MODULE	NAME: _____ _____ _____		
I. <u>CRITERIA SUMMARY WORKSECTION:</u> 1. Consistency 2. Completeness			SCORE
II. <u>FACTOR WORKSECTION:</u> Factor Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Criteria}}$			
III. <u>EVALUATION WORKSECTION:</u> What is your evaluation of the reviewed products based on the criteria above? (1-10) _____ (§ If you are unable to evaluate)			

PREPARED BY: _____ APPROVED BY: _____
 DATE: _____ DATE: _____

CORRECTNESS

Complete this score chart if application of this set of worksheets is appropriate when products of A1, A2, A3, A4, B and D in Design Phase become available.



FIRST MEASUREMENT

Date _____

CORRECTNESS

Complete this score chart if application of this set of worksheets is appropriate when products of C in Coding and Checkout phase is available.

<u>Data Element Number</u>	<u>Answer of Data Element</u>	<u>Data Element Score</u>	<u>Metric Score</u>	<u>Criteria Score</u>	<u>Factor Score</u>
<u>101</u>					
<u>102</u>					
<u>103</u>					
<u>104</u>					
<u>42</u>					
<u>105</u>					
<u>2</u>					
<u>3</u>					
<u>4</u>					
<u>5</u>					
<u>6</u>					
<u>7</u>					
<u>8</u>					
<u>3</u>					
<u>4</u>					
<u>5</u>					

SECOND MEASUREMENT

Date _____

CORRECTNESS

Complete this score chart if application of this set of worksheets is appropriate when products of B-D3 and B-D4 in Test and Integration Phase are available.

<u>Data Element Number</u>	<u>Answer of Data Element</u>	<u>Data Element Score</u>	<u>Metric Score</u>	<u>Criteria Score</u>	<u>Factor Score</u>
<u>101</u>					
<u>102</u>					
<u>103</u>					
<u>104</u>					
<u>42</u>					
<u>105</u>					
<u>2</u>					
<u>3</u>					
<u>4</u>					
<u>5</u>					
<u>6</u>					
<u>7</u>					
<u>8</u>					

THIRD MEASUREMENT

Date _____

TRACEABILITY CHECKLIST

Form Code: CoIMM.1

LIFE CYCLE PHASE:

IMPLEMENTATION

SOURCE(S):

☐ SYSTEM

NAME: _____

☐ SUBSYSTEM

☐ MODULE

I. DATA COLLECTION WORKSECTION:

SCORE

1.0 Cross Reference (Traceability) (29)

1.1 Is there a matrix relating itemized requirements to modules which implement these requirements.

☐ Y ☐ N

Yes = 1, No = 0

☐

II. METRIC WORKSECTION:

Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the data elements above?
(1-10) _____ (0 If you are unable to evaluate)

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

TRACEABILITY

Form Code: CoIMC.1

LIFE CYCLE PHASE:

IMPLEMENTATION

SOURCE(S):

CoIMM.1

☐ SYSTEM

NAME: _____

☐ SUBSYSTEM

☐ MODULE

I. METRIC SUMMARY WORKSECTION:

1. Traceability Checklist

SCORE

☐

II. CRITERIA WORKSECTION:

Criteria Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Metrics}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the metrics above?
(1-10) _____ (§ If you are unable to evaluate)

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

<u>CORRECTNESS</u>			Form Code: <u>CoIMF.1</u>
LIFE CYCLE PHASE: IMPLEMENTATION		SOURCE(S): <u>CoIMC.1</u>	
☐ SYSTEM ☐ SUBSYSTEM ☐ MODULE	NAME: _____ _____ _____		
I. <u>CRITERIA SUMMARY WORKSECTION:</u> 1. Traceability			SCORE ☐
II. <u>FACTOR WORKSECTION:</u> $\text{Factor Value} = \frac{\text{Sum of Above Scores}}{\text{No. of Criteria}}$			☐
III. <u>EVALUATION WORKSECTION:</u> What is your evaluation of the reviewed products based on the criteria above? (1-10) _____ (§ If you are unable to evaluate)			
PREPARED BY: _____		APPROVED BY: _____	
DATE: _____		DATE: _____	

CORRECTNESS

Complete this score chart if application of this set of worksheets is appropriate for update when products of A and B in Coding and Checkout Phase become available

<u>Data Element Number</u>	<u>Answer of Data Element</u>	<u>Data Element Score</u>	<u>Metric Score</u>	<u>Criteria Score</u>	<u>Factor Score</u>
<u>29</u>					
<u>FIRST MEASUREMENT</u>			Date <u> </u>		

Complete this score chart if an application of this set of worksheets is appropriate for update when products of B-D2 in Test and Integration Phase is available.

<u>Data Element Number</u>	<u>Answer of Data Element</u>	<u>Data Element Score</u>	<u>Metric Score</u>	<u>Criteria Score</u>	<u>Factor Score</u>
<u>29</u>					
<u>SECOND MEASUREMENT</u>			Date <u> </u>		

Complete this score chart if an application of this set of worksheets is appropriate for update when products of B-D2 in Test and Integration Phase is available.

<u>Data Element Number</u>	<u>Answer of Data Element</u>	<u>Data Element Score</u>	<u>Metric Score</u>	<u>Criteria Score</u>	<u>Factor Score</u>
<u>29</u>					
<u>THIRD MEASUREMENT</u>			Date <u> </u>		

QUALITY FACTOR

MODULE NO. 2

RELIABILITY

TABLE OF CONTENTS

<u>TITLE</u>	<u>PAGE</u>
<u>INTRODUCTION AND INSTRUCTIONS FOR RELIABILITY MODULE</u>	
INTRODUCTION TO RELIABILITY	Re-1
STEPS FOR COMPLETING WORKSHEETS	Re-5
STEPS FOR UPDATE APPLICATIONS	Re-8
HOW TO USE SCORE CHART SETS	Re-9
ESD PRODUCTS FOR ANALYSIS PHASE	Re-12
ESD PRODUCTS FOR DESIGN PHASE	Re-13
ESD PRODUCTS FOR CODING AND CHECKING PHASE. .	Re-14
ESD PRODUCTS FOR TEST AND INTEGRATION PHASE .	Re-15
 <u>QUALITY FACTOR NO. 2 RELIABILITY WORKSHEETS</u>	
WORKSHEETS FOR REQUIREMENTS ANALYSIS PHASE. .	Re-16
WORKSHEETS FOR PRELIMINARY DESIGN PHASE . . .	Re-25
WORKSHEETS FOR DETAIL DESIGN PHASE.	Re-34
WORKSHEETS FOR IMPLEMENTATION PHASE	Re-47

This QUALITY FACTOR MODULE is one of a set of eleven modules that are components of the "COMPUTER SYSTEMS ACQUISITION METRICS HANDBOOK".

INTRODUCTION AND INSTRUCTIONS
FOR
RELIABILITY MODULE

INTRODUCTION TO RELIABILITY

The Quality Factor Reliability represents a measure of the extent to which a program can be expected to perform its intended function with required precision. FIGURES Re - 1 through Re - 4 represent the hierarchy of Metric, Criteria and Quality Factor worksheets associated with Reliability in Requirements Analysis, Preliminary Design, Detailed Design and Implementation phases of the Software Development Life Cycle.

The worksheets in this module are grouped into four separate sets, one set for each Life Cycle phase. Each set consists of Metric worksheets, Criteria worksheets, a Factor worksheet and score charts.

METRIC WORKSHEETS

One or more DATA COLLECTION WORKSECTIONS which contain the data element scores for each Metric, and each Metric's Final Score.

CRITERIA WORKSHEETS

One or more METRIC SUMMARY WORKSECTIONS which contain the Metrics scores for each Criteria, and each Criteria's Final Score.

FACTOR WORKSHEETS

One CRITERIA SUMMARY WORKSECTION which contains each Criteria's score, and the Final Score for the Factor for that phase.

SCORE CHARTS:

One or more charts that record worksheet values throughout the Life Cycle.

However, the sequence in which the worksheet sets are applied is dependent on the availability of ESD Computer Program Life Cycle products. Usually the worksheets will be applied sequentially, except for updates.

These instructions show when the Reliability worksheet sets and Score Charts are applied during the Computer Program Life Cycle. The Product Code referred to on the Score Charts is the code defined in the ESD Guidebook Series, Software Acquisition Management Guidebook, Life Cycle Events and reillustrated in the General Instructions. The Product Tables map the ESD Computer Program Life Cycle Products to the Metric Worksheets. The balance of these instructions are step-by-step procedures for completing the worksheets and score chart summaries.

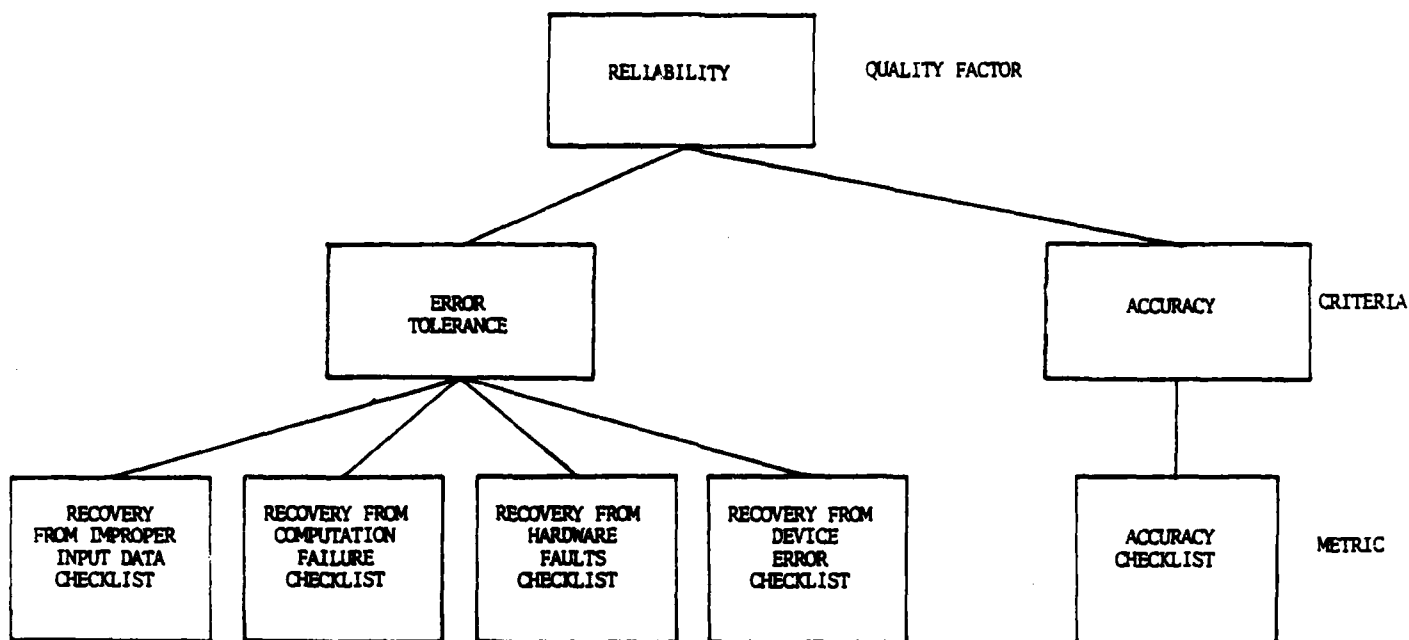


FIGURE Re-1
REQUIREMENTS ANALYSIS WORKSHEET HIERARCHY

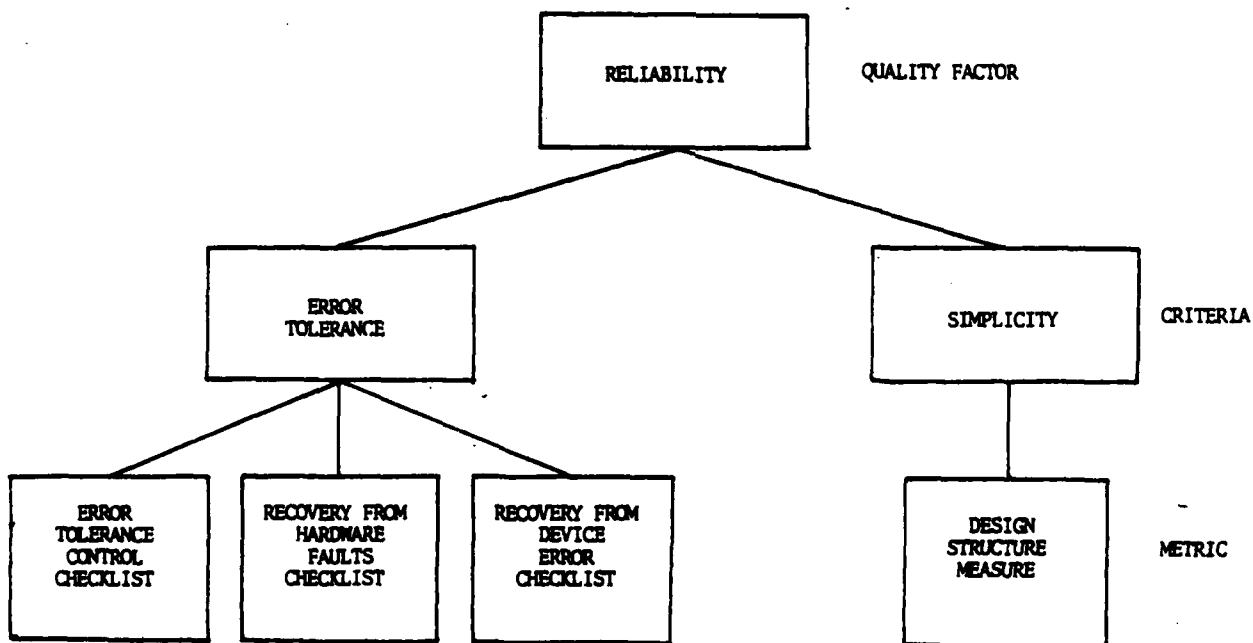


FIGURE Re-2
PRELIMINARY DESIGN WORKSHEET HIERARCHY

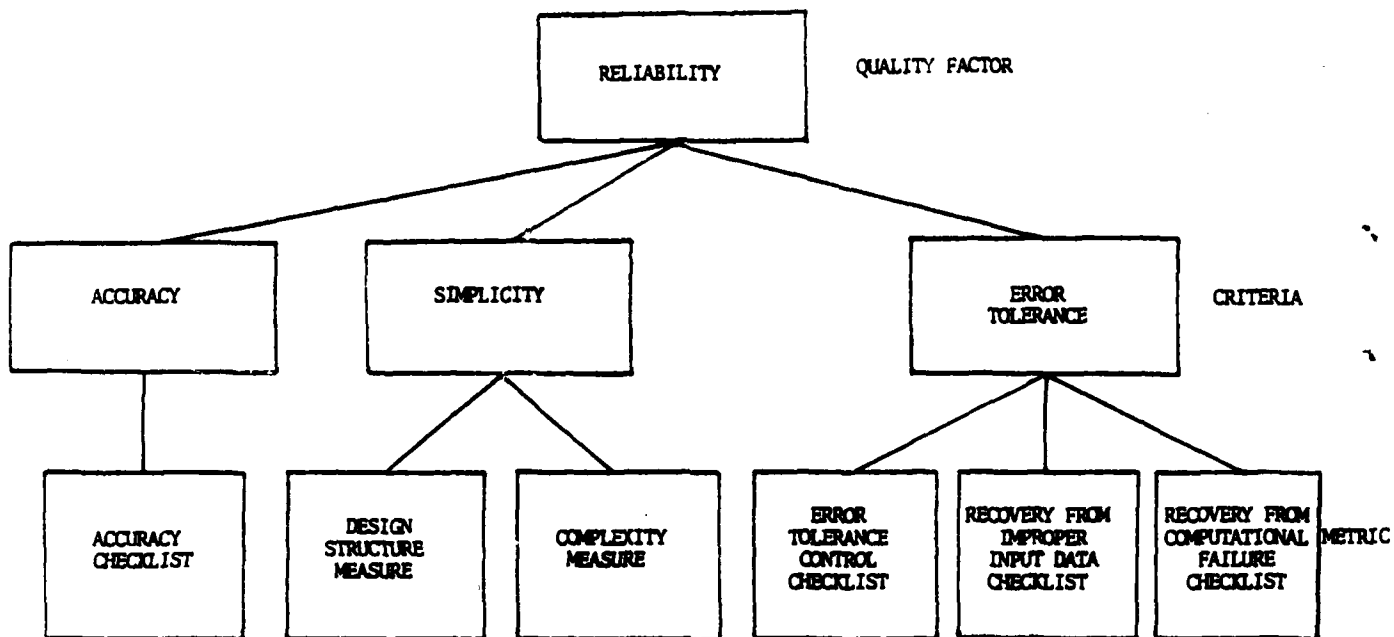


FIGURE Re-3
DETAILED DESIGN WORKSHEET HIERARCHY

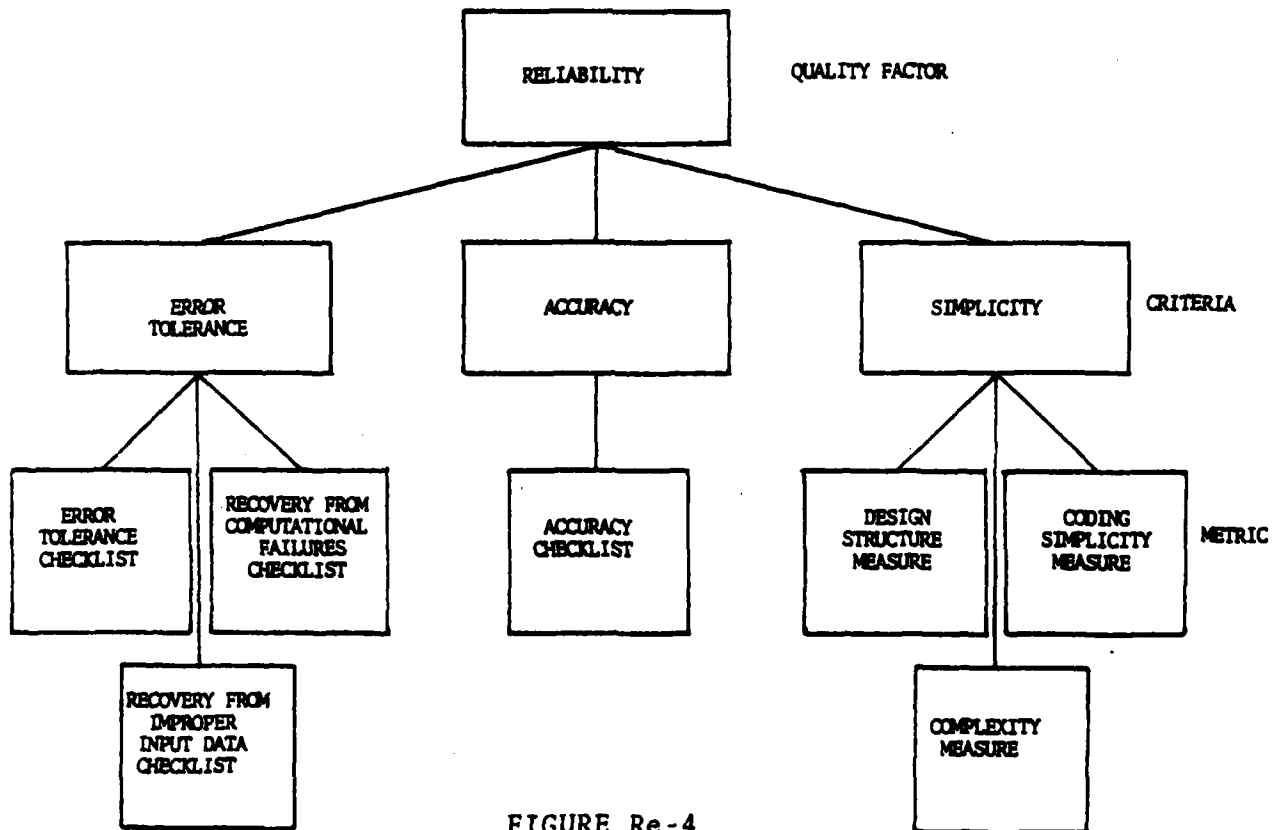


FIGURE Re-4
IMPLEMENTATION WORKSHEET HIERARCHY

STEPS FOR COMPLETING WORKSHEETS

Step 1

Enter the appropriate information in the following blocks:

- (1.1) SYSTEM/SUBSYSTEM/MODULE block-Indicate the level of application.
- (1.2) NAME block-List the name of the system being measured.
- (1.3) SOURCE block-On Metric Worksheets, list the source document.
- (1.4) The PREPARED BY and DATE blocks should contain the name of the person performing the software metrics, and the current date.

Step 2

Determine the current Computer Program Life Cycle Phase. This module is concerned with four phases of the Computer Program Life Cycle:

- (2.1) Requirements Analysis
- (2.2) Preliminary Design
- (2.3) Detail Design
- (2.4) Implementation

Step 3

Determine the available products from the phase and which data worksheet set to apply. Each Life Cycle phase has at least three different activities associated with it. The result of the completion of an activity is one or more documents called products.

Before a worksheet set can be applied, specific products associated with it must be obtained. The Product Tables, at the end of the instructions, detail the products required for each worksheet set.

Step 4 - METRIC WORKSHEETS

- (4.1) Answer each question in the Data Collection Worksection as it applies to the system/subsystem/module you are measuring and transfer its scored value to its corresponding SCORE block.

If the question calls for a YES/NO type response, a YES answer is scored at a 1.
a NO answer is scored as a 0.

The questions that call for a numeric quantity type response have specific instructions on how to score the response. Follow the instructions under each data element.

- (4.2) Find the Metric Value by following the algorithm on the worksheet.
- (4.3) Answer the Evaluation Worksection - evaluate the products based on the data elements as they apply to the system.
- (4.4) When you have repeated this procedure for all the Metric Worksheets in the set, you are ready to use the Criteria Worksheets.

Step 5 - CRITERIA WORKSHEETS

- (5.1) Each numbered item in the Metric Summary Worksection represents an individual Metric Value.

- (5.2) Find the Form Code in the SOURCE box of the Criteria Worksheet.
- (5.3) Find the Metric Worksheet with the same Form Code and transfer its Metric Value into the box to the right of the item in the Criteria Worksheet.
- (5.4) Repeat this process for all items in the Metric Summary Worksection.
- (5.5) Find the Criteria Value by following the algorithm on the worksheet.
- (5.6) Answer the Evaluation Worksection - evaluate the products based on the Metrics as they apply to the system.

Step 6 - FACTOR WORKSHEETS

- (6.1) Each numbered item in the Criteria Summary Worksection represents an individual Criterion Value.
- (6.2) Find the Form Code in the SOURCE box of the Factor Worksheet.
- (6.3) Find the Criteria Worksheet with the same Form Code and transfer its Criteria Value into the box in the Score column in the Factor Worksheet.
- (6.4) Repeat this process for all items in the Criteria Summary Worksection.
- (6.5) Answer the Evaluation Worksection - evaluate the products based on the Criteria as they apply to the system.
- (6.6) Find the Factor Value by following the algorithm on the Worksheet.

STEPS FOR UPDATE APPLICATIONS

Step 1

Determine the update necessary. The Product Tables at the end of these instructions list the updates required and the activities and products associated with each update. Also review Section 2.3.2, "Update Information Requirements", in the General Instructions Handbook for further information if necessary.

Step 2

Obtain the required products. The Products Tables at the end of these Instructions list the products required for each update application.

Step 3

Reapply the Metric, Criteria, and Factor worksheets by following the procedure already outlined in "Steps for Completing Worksheets", of these Instructions. "How to Use Score Chart sets", explains the procedure for reporting the update scores.

HOW TO USE SCORE CHART SETS

When you apply worksheets to system/subsystem/module, you must apply some worksheets more than once in the Computer Program Life Cycle. Because of this, a Score Chart set is organized so that the groups of worksheet scores, acquired at the times a set of worksheets is applied, can be recorded separately: originals & updates.

The Score Chart set (at the end of each worksheet set) is composed of similar tree structure diagrams. Each Score Chart represents the complete hierarchy of scores to be acquired during any one application of worksheets sets in the Life Cycle.

When applying any worksheet, in order to record scores you must locate and use the Score Chart that corresponds to the current phase in the Life Cycle. In a Score Chart set, the first Score Chart (labeled FIRST MEASUREMENT) is designed to receive the scores from the first application of a worksheet set in the Life Cycle, and the following charts (i.e., labeled SECOND MEASUREMENT, etc.) are designed to receive the scores from the updates.

Each data element in the Metrics Worksheet has a unique number in the Data Element Dictionary, which is listed in the first column in the Score Chart. The next two columns of boxes in a Score Chart show a worksheet set's individual data element raw scores and its interpreted response (Yes/No, = 1 or 0, etc.). The last three box columns map out the Metric, Criteria and Factor worksheets of a set, each box representing the total score of a corresponding worksheet.

Once you have finished scoring a Worksheet set and located the corresponding Score Chart set, use the following procedure for filling out the Score Chart:

Step 1 - ANSWER OF DATA ELEMENT/DATA ELEMENT SCORE

For each data element in a Metric Worksheet:

- (1.1) Reference its number in the "Data Element Number" Column in the Score Chart.
- (1.2) Transfer the answers you gave to the questions in the Data Collection Worksection to the corresponding box under the column headed "Answer of Data Element"
- (1.3) Transfer the Scores of the data element from the Data Collection Worksection to its corresponding box under column labeled "Data Element Score".
- (1.4) Repeat this step for all data elements within this phase.

Step 2 - METRIC SCORE

Each box in this column represents the Score from the Metric Worksection of a Metric Worksheet. Transfer the Metric Value from each Metric Worksheet into the corresponding boxes in the Score Chart's Metric Score Column.

Step 3 - CRITERIA SCORE

Each box in this column represents the score from the Criteria Worksection of a Criteria Worksheet into the corresponding boxes of the Score Chart's Criteria Score Column.

Step 4 - FACTOR SCORE

Each box in this column represents the score from the Factor Worksection of a Quality Factor Worksheet. Transfer the Factor from the set's Factor Worksheet into corresponding boxes of the Score Chart's Factor Score Column.

These Score Chart sets will provide a historical base for repeated application of the metrics to a system at all levels. They are also a useful means of reporting your finds to the program manager in a condensed and compact form.

PRODUCTS	TRADE-OFF STUDY REPORTS	INITIAL OR AUTHENTICATED SYSTEM SPEC, SEGMENT SPEC	AUTHENTICATED DEVELOPMENT SPEC FOR CPCI	HIGHER LEVEL SPEC	DRAFT PRODUCT SPECS	PDR MINUTES AND ACTION ITEM RESPONSES
WORKSHEET SET TO BE APPLIED	REQUIREMENTS ANALYSIS WORKSHEETS				PRELIMINARY DESIGN WORKSHEETS	

ESD PRODUCTS FOR ANALYSIS PHASE

Apply the Requirement Analysis Worksheets as the following types of products become available. See note below.

- Product A.1 - Trade-off Study Reports
- Product A.2 - Initial or Authenticated System Specification & Segment Specification (if any)
- Product B.1 - Authenticated Development Specification for each CPCI
- Product B.2 - Possible higher-level specification, ICD and changes

Apply the Preliminary Design Worksheets as the following types of products become available. See note below.

- Product B.3 - Parts of draft Product Specifications containing design approaches for each CPCI
- Product C. - PDR minutes and action item responses

NOTE: If these products do not contain the information requested by the Data Element questions, other contractor-supplied information should be searched.

PRODUCTS	FUNCTIONAL FLOW CHARTS	DE- TAILED FLOW CHART	DATA FORMAT DESC.	ALGO- RITHM DESC.	PRELIMI- NARY PRODUCT DESC.	CDR MINUTES ACTION ITEM RESPON- SES	SYSTEM SEG- MENT TEST PLANS	PRELIM. CPCI TEST PRO- CEDURES
WORKSHEET SET TO BE APPLIED	DETAILED DESIGN WORKSHEETS						PRELIMINARY DESIGN WORKSHEETS, (UPDATE)	

ESD PRODUCTS FOR DESIGN PHASE

Apply the Detailed Design Worksheets as the following types of products become available. See note below.

- Product A.1: Functional flowcharts
- Product A.2: Detailed flowcharts
- Product A.3: Data format descriptions
- Product A.4: Descriptions of algorithms not previously prescribed
- Product B. : Preliminary Product Specifications, including the above
- Product D. : CDR minutes & action item responses

Apply the Preliminary Design Worksheets for Update as the following types of products become available. See note.

- Product C.1: System, Segment and CPCI Test Plans
- Product C.2: Preliminary CPCI Test Procedures

NOTE: If these products do not contain the information requested by the Data Element questions, other contractor-supplied information should be searched.

PRODUCTS	CODE	ALTERED PRODUCT SPECS
WORKSHEET SET TO BE APPLIED	IMPLEMENTATION WORKSHEETS	DETAILED DESIGN WORKSHEETS (UPDATE)

ESD PRODUCTS FOR CODING AND CHECKING PHASE

Apply the Implementation Worksheets as the code becomes available.

Apply the Detailed Design Worksheets for Update as the following types of products become available. See note below.

- Product C. - Altered Product Specifications, including compiler/assembly listings.

NOTE: If these products do not contain the information requested by the Data Element questions, other contractor-supplied information should be searched.

PRODUCTS	FINAL CPCI TEST PROCEDURES	SEGMENT & SYSTEM LEVEL TEST PROCEDURES	TEST REPORTS	CODING CHANGES	MODIFIED PRODUCT SPECS	HIGH LEVEL SPECS
WORKSHEET SET TO BE APPLIED	PRELIMINARY DESIGN WORKSHEETS			IMPLEMEN- TATION WORKSHEETS	DETAILED DESIGN WORKSHEETS (UPDATE)	

ESD PRODUCTS FOR TEST AND
INTEGRATION PHASE

Apply the Preliminary Design Worksheets for Update as the following types of products become available. See note below.

- A Product 1: Final CPCI Test Procedures
- Product 2: Segment (if any) and system-level Test Procedures

- B-D Product 1: Test Reports

Apply the Implementation Worksheets for Update as the following types of products become available. See note below.

- B-D Product 2: Computer Program Coding Changes

Apply the Detailed Design Worksheets for Update as the following types of products become available. See note.

- B-D Product 3: Modified Product Specification
- Product 4: Possible high-level specification, ICD and changes.

NOTE: If these products do not contain the information requested by the Data Element questions, other contractor-supplied information should be searched.

RECOVERY FROM IMPROPER INPUT DATA CHECKLIST

Form Code: ReRAM.1

LIFE CYCLE PHASE:

REQUIREMENTS ANALYSIS

SOURCE(S):

☐ SYSTEM

NAME: _____

☐ SUBSYSTEM

☐ MODULE

I. DATA COLLECTION WORKSECTION:

SCORE

1. Error Tolerance of Input Data(11)

1.1 Are there definitive statements of the error tolerance for input data?

☐ Y ☐ N

Yes = 1, No = 0

☐

II. METRIC WORKSECTION:

Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the data elements above?
(1-10) _____ (Ø If you are unable to evaluate)

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

RECOVERY FROM COMPUTATIONAL FAILURES CHECKLIST

Form Code: ReRAM.2

LIFE CYCLE PHASE:

REQUIREMENT ANALYSIS

SOURCE(S):

☐ SYSTEM

NAME: _____

☐ SUBSYSTEM

☐ MODULE

I. DATA COLLECTION WORKSECTION:

SCORE

1.0 Recovery from Computational Failures (12)

1.1 Are there definitive statements of the requirements for recovery from computational failures?

☐ Y ☐ N

Yes = 1, No = 0

II. METRIC WORKSECTION:

Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the data elements above?
(1-10) _____ (Ø If you are unable to evaluate)

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

RECOVERY FROM HARDWARE FAULTS CHECKLIST

Form Code: ReRAM.3

LIFE CYCLE PHASE:

REQUIREMENTS ANALYSIS

SOURCE(S):

☐ SYSTEM

NAME: _____

☐ SUBSYSTEM

☐ MODULE

I. DATA COLLECTION WORKSECTION:

SCORE

1.0 Statements of Recovery from Hardware Faults (13)

1.1 Is there a definitive statement of the requirement for recovery from hardware faults?

☐ Y ☐ N

Yes = 1, No = 0

☐

II. METRIC WORKSECTION:

Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the data elements above?
(1-10) _____ (Ø If you are unable to evaluate)

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

RECOVERY FROM DEVICE ERRORS CHECKLIST

Form Code: ReRAM.4

LIFE CYCLE PHASE: REQUIREMENT ANALYSIS		SOURCE(S): _____ _____ _____
☐ SYSTEM	NAME: _____	
☐ SUBSYSTEM	_____	
☐ MODULE	_____	

I. <u>DATA COLLECTION WORKSECTION:</u>	SCORE
1.0 <u>Statements of Recovery from Device Errors</u> (14) 1.1 Is there a definitive statement of the requirement for recovery from device errors? ☐ Y ☐ N Yes = 1, No = 0	☐
II. <u>METRIC WORKSECTION:</u> Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$	☐
III. <u>EVALUATION WORKSECTION:</u> What is your evaluation of the reviewed products based on the data elements above? (1-10) _____ (Ø If you are unable to evaluate)	
IV. <u>INSPECTOR'S COMMENTS:</u>	

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

ACCURACY CHECKLIST

Form Code: ReRAM.5

LIFE CYCLE PHASE: REQUIREMENT ANALYSIS		SOURCE(S): 	
☐ SYSTEM ☐ SUBSYSTEM ☐ MODULE	NAME: _____ _____ _____		

I. <u>DATA COLLECTION WORKSECTION:</u>	SCORE
1.0 <u>Error Analysis</u> (9) 1.1 Has an error analysis been performed and budgeted to function? Y N Yes = 1, No = 0 2.0 <u>Accuracy Requirement</u> (10) 2.1 Are there definitive statements of the accuracy requirements for inputs, processing, and constants? Y N Yes = 1, No = 0	
II. <u>METRIC WORKSECTION:</u>	
III. <u>EVALUATION WORKSECTION:</u> What is your evaluation of the reviewed products based on the data elements above? (1-10) _____ (# If you are unable to evaluate)	
IV. <u>INSPECTOR'S COMMENTS:</u>	

PREPARED BY: _____ APPROVED BY: _____
 DATE: _____ DATE: _____

ERROR TOLERANCE

Form Code: ReRAC.1

LIFE CYCLE PHASE:

REQUIREMENT ANALYSIS

SOURCE(S):

ReRAM.1

ReRAM.2

☐ **SYSTEM**

NAME: _____

☐ **SUBSYSTEM**

ReRAM.3

ReRAM.4

☐ **MODULE**

I. METRIC SUMMARY WORKSECTION:

1. Recovery from Improper Input Data Checklist
2. Recovery from Computational Failure Checklist
3. Recovery from Hardware Faults Checklist
4. Recovery from Device Error Checklist

SCORE

☐
☐
☐
☐

II. CRITERIA WORKSECTION:

Criteria Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Metrics}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the metrics above?
(1-10) _____ (§ If you are unable to evaluate)

PREPARED BY: _____ **APPROVED BY:** _____

DATE: _____ **DATE:** _____

ACCURACY

Form Code: ReRAC.2

LIFE CYCLE PHASE:

REQUIREMENT ANALYSIS

SOURCE(S):

ReRAM.5

☐ SYSTEM

NAME: _____

☐ SUBSYSTEM

☐ MODULE

I. METRIC SUMMARY WORKSECTION:

1. Accuracy Checklist

SCORE

☐

II. CRITERIA WORKSECTION:

Criteria Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Metrics}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the metrics above?
(1-10) _____ (If you are unable to evaluate)

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

RELIABILITY

Form Code: ReRAF.1

LIFE CYCLE PHASE:
REQUIREMENT ANALYSIS

SOURCE(S):

ReRAC.1

ReRAC.2

☐ SYSTEM

NAME: _____

☐ SUBSYSTEM

☐ MODULE

I. CRITERIA SUMMARY WORKSECTION:

1. Error Tolerance

2. Accuracy

SCORE

☐☐

II. FACTOR WORKSECTION:

Factor Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Criteria}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the criteria above?
(1-10) _____ (§ If you are unable to evaluate)

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

RELIABILITY

Complete this score chart if an application of this set of worksheets is appropriate when products of A1, A2, B1 and B2 become available.

Data Element Number	Answer of Data Element	Data Element Score	Metric Score	Criteria Score	Factor Score
<u>11</u>					
<u>12</u>					
<u>13</u>					
<u>14</u>					
<u>9</u>					
<u>10</u>					

FIRST MEASUREMENT

Date _____

Complete this score chart if a second application of this set of worksheets is appropriate for update when products of A1, A2, B1 and B2 are available.

Data Element Number	Answer of Data Element	Data Element Score	Metric Score	Criteria Score	Factor Score
<u>11</u>					
<u>12</u>					
<u>13</u>					
<u>14</u>					
<u>9</u>					
<u>10</u>					

SECOND MEASUREMENT

Date _____

ERROR TOLERANCE CONTROL CHECKLIST

Form Code: RePDM.1

LIFE CYCLE PHASE: PRELIMINARY DESIGN		SOURCE(S): _____ _____	
☐ SYSTEM	NAME: _____		
☐ SUBSYSTEM	_____		
☐ MODULE	_____		

I. <u>DATA COLLECTION WORKSECTION:</u>			SCORE
1.0 <u>Central Control (31)</u>			
1.1 Is concurrent processing centrally controlled?	☐ Y ☐ N		☐
Yes = 1, No = 0			
2.0 <u>Error Fixable and Processing Continued (32)</u>			
2.1 Number of errors that are automatically bypassed while processing continues.	☐		
2.2 Number of error conditions are reported by the system.	☐		
Score = ☐ 2.1 + ☐ 2.2			☐
II. <u>METRIC WORKSECTION:</u>			
Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$			☐
III. <u>EVALUATION WORKSECTION:</u> What is your evaluation of the reviewed products based on the data elements above? (1-10) _____ (§ If you are unable to evaluate)			
IV. <u>INSPECTOR'S COMMENTS:</u>			

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

RECOVERY FROM HARDWARE FAULTS CHECKLIST

Form Code: RePDM.2

LIFE CYCLE PHASE: PRELIMINARY DESIGN		SOURCE(S): _____ _____ _____
☐ SYSTEM	NAME: _____	
☐ SUBSYSTEM	_____	
☐ MODULE	_____	

I. <u>DATA COLLECTION WORKSECTION:</u>	SCORE
1.0 <u>Provisions of Recovery from Hardware Faults</u> (33) 1.1 Are provisions for recovery from hardware faults provided? Y N Yes = 1, No = 0	☐
II. <u>METRIC WORKSECTION:</u> Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$	☐
III. <u>EVALUATION WORKSECTION:</u> What is your evaluation of the reviewed products based on the data elements above? (1-10) _____ (# If you are unable to evaluate)	
IV. <u>INSPECTOR'S COMMENTS:</u>	

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

RECOVERY FROM DEVICE ERROR CHECKLIST

Form Code: RePDM.3

LIFE CYCLE PHASE:

PRELIMINARY DESIGN

SOURCE(S):

☐ SYSTEM

NAME: _____

☐ SUBSYSTEM

☐ MODULE

I. DATA COLLECTION WORKSECTION:

SCORE

1.0 Provisions of Recovery from Device Errors (34)

1.1 Are provisions for recovery from device errors provided?

☐ Y ☐ N

Yes = 1, No = 0

☐

II. METRIC WORKSECTION:

Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the data elements above? (1-10) _____ (Ø If you are unable to evaluate)

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

DESIGN STRUCTURE MEASURE

Form Code: RePDM.4

LIFE CYCLE PHASE:

PRELIMINARY DESIGN

- ☐ SYSTEM
☐ SUBSYSTEM
☐ MODULE

NAME: _____

SOURCE(S):

I. DATA COLLECTION WORKSECTION:

SCORE

1.0 Hierarchical Structure (35)

1.1 Is a hierarchical chart provided which identifies all modules in the system?

☐ Y ☐ N

Yes = 1, No = 0

☐

2.0 Module Independence (36)

2.1 Is the module independent of the source of the input or the destination of the output?

☐ Y ☐ N

Yes = 1, No = 0

☐

3.0 Size of Data Base (70)

3.1 Number of unique data items in data base.

☐

Score = 1 + ☐ 3.1

☐

II. METRIC WORKSECTION:

Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$

☐

**III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the metrics above?
 (1-10) _____ (Ø If you are unable to evaluate)**

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

ERROR TOLERANCE

Form Code: RePDC.1

LIFE CYCLE PHASE:

PRELIMINARY DESIGN

SOURCE(S):

RePDM.1

RePDM.2

☐ **SYSTEM**

NAME: _____

☐ **SUBSYSTEM**

RePDM.3

☐ **MODULE**

I. METRIC SUMMARY WORKSECTION:

1. Error Tolerance Control Checklist
2. Recovery from Hardware Faults Checklist
3. Recovery from Device Error Checklist

SCORE

☐
☐
☐

II. CRITERIA WORKSECTION:

Criteria Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Metrics}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the metrics above?
(1-10) _____ (§ If you are unable to evaluate)

PREPARED BY: _____ **APPROVED BY:** _____

DATE: _____ **DATE:** _____

SIMPLICITY

Form Code: RePDC.2

LIFE CYCLE PHASE:

PRELIMINARY DESIGN

SOURCE(S):

RePDM.4

☐ SYSTEM

NAME: _____

☐ SUBSYSTEM

☐ MODULE

I. METRIC SUMMARY WORKSECTION:

1. Design Structure Measure

SCORE

☐

II. CRITERIA WORKSECTION:

Criteria Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Metrics}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the metrics above?
(1-10) _____ (Ø If you are unable to evaluate)

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

RELIABILITY

Form Code: RePDF.1

LIFE CYCLE PHASE:

PRELIMINARY DESIGN

SOURCE(S):

RePDC.1

RePDC.2

☐

SYSTEM

NAME: _____

☐

SUBSYSTEM

☐

MODULE

I. CRITERIA SUMMARY WORKSECTION:

1. Error Tolerance
2. Simplicity

SCORE

☐
☐

II. FACTOR WORKSECTION:

Factor Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Criteria}}$

☐

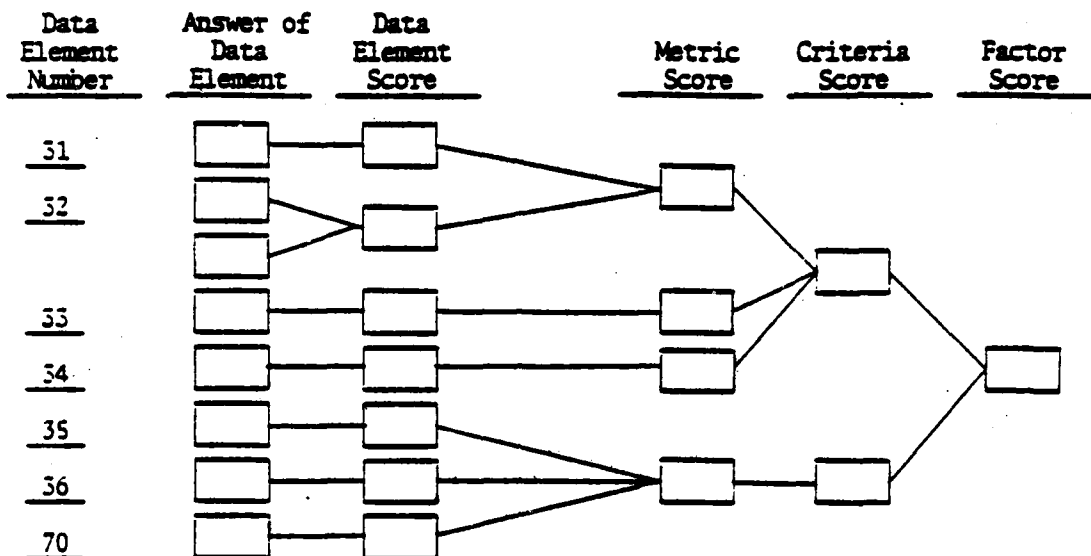
III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the criteria above?
(1-10) _____ (§ If you are unable to evaluate)

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

RELIABILITY

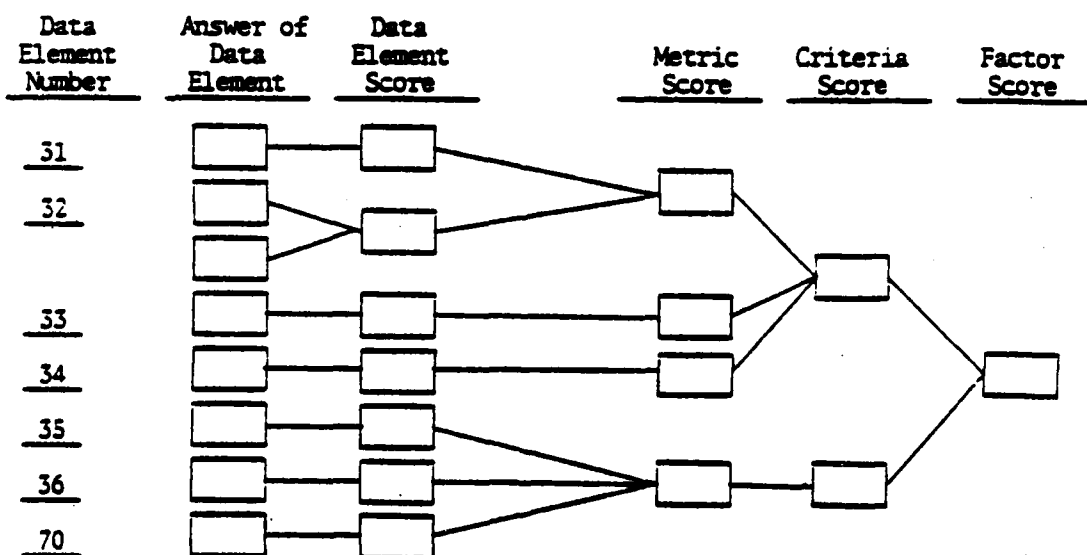
Complete this score chart if an application of this set of worksheets is appropriate when products of B3 and C in Analysis Phase become available.



FIRST MEASUREMENT

Date _____

Complete this score chart if application of this set of worksheets is appropriate for update when products of C1, C2 in Design Phase are available.



SECOND MEASUREMENT

Date _____

RELIABILITY

Complete this score chart if application of this set of worksheets is appropriate for update when products of A1, A2 and B-D1 in Test and Integration Phase are available.

Data Element Number	Answer of Data Element	Data Element Score	Metric Score	Criteria Score	Factor Score
<u>31</u>					
<u>32</u>					
<u>33</u>					
<u>34</u>					
<u>35</u>					
<u>36</u>					
<u>70</u>					

THIRD MEASUREMENT

Date _____

Complete this score chart if application of this set of worksheets is appropriate for update when products of A1, A2 and B-D1 in Test and Integration Phase are available.

Data Element Number	Answer of Data Element	Data Element Score	Metric Score	Criteria Score	Factor Score
<u>31</u>					
<u>32</u>					
<u>33</u>					
<u>34</u>					
<u>35</u>					
<u>36</u>					
<u>70</u>					

FOURTH MEASUREMENT

Date _____

ERROR TOLERANCE CONTROL CHECKLIST

Form Code: ReDDM.1

LIFE CYCLE PHASE:

DETAIL DESIGN

SOURCE(S):

- ☐ SYSTEM
☐ SUBSYSTEM
☐ MODULE

NAME: _____

I. DATA COLLECTION WORKSECTION:

SCORE

1.0 Detected Error Condition (72)

1.1 When an error condition is detected,
is it passed to the calling module?

☐ Y ☐ N

Yes = 1, No = 0

☐

II. METRIC WORKSECTION:

Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the
reviewed products based on the data elements above?
(1-10) _____ (§ If you are unable to evaluate)

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

RECOVERY FROM IMPROPER INPUT DATA CHECKLIST

Form Code: ReDDM.2

LIFE CYCLE PHASE:

DETAIL DESIGN

SOURCE(S):

☐

SYSTEM

NAME: _____

☐

SUBSYSTEM

☐

MODULE

I. DATA COLLECTION WORKSECTION:

SCORE

1.0 Value of Input Ranges (74)

1.1 Are values of inputs range tested? ☐ Y ☐ N

Yes = 1, No = 0

2.0 Redundant Input Data (75)

2.1 Are conflicting requests and illegal combinations identified and checked? ☐ Y ☐ N

Yes = 1, No = 0

3.0 Sufficiency of Input Data (76)

3.1 Is there a check to see if all necessary data is available before processing begins? ☐ Y ☐ N

Yes = 1, No = 0

4.0 Input Checking (77)

4.1 Is all input checked, reporting all errors, before processing begins? ☐ Y ☐ N

Yes = 1, No = 0

II. METRIC WORKSECTION:

Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the data elements above? (1-10) _____ (Ø If you are unable to evaluate)

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

RECOVERY FROM COMPUTATIONAL FAILURES CHECKLIST

Form Code: ReDDM.3

LIFE CYCLE PHASE:

DETAIL DESIGN

SOURCE(S):

- ☐ SYSTEM
☐ SUBSYSTEM
☐ MODULE

NAME: _____

I. DATA COLLECTION WORKSECTION:

SCORE

1.0 Range Test for Loop and Multiple Transfer Index Parameters (78)

1.1 Are loop and multiple transfer index parameters range tested before use? ☐ Y ☐ N

Yes = 1, No = 0

☐

2.0 Subscript Checking (79)

2.1 Are subscript values range tested before use? ☐ Y ☐ N

Yes = 1, No = 0

☐

3.0 Output Checking (80)

3.1 Is output checked for reasonableness before processing continues? ☐ Y ☐ N

Yes = 1, No = 0

☐

II. METRIC WORKSECTION:

Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the data elements above? (1-10) _____ (0 If you are unable to evaluate)

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

ACCURACY CHECKLIST

Form Code: ReDDM.4

LIFE CYCLE PHASE:

DETAIL DESIGN

SOURCE(S):

☐ SYSTEM

NAME: _____

☐ SUBSYSTEM

☐ MODULE

I. DATA COLLECTION WORKSECTION:

SCORE

1.0 Sufficiency of Numerical Methods (73)

1.1 Have the numerical techniques being used in an algorithm been analyzed with regards to accuracy requirements?

☐ Y ☐ N

Yes = 1, No = 0

☐

II. METRIC WORKSECTION:

Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the data elements above?
(1-10) _____ (Ø If you are unable to evaluate)

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

COMPLEXITY MEASURE		Form Code: <u>ReDDM.5</u>
LIFE CYCLE PHASE: DETAIL DESIGN		SOURCE(S): _____
☐ SYSTEM ☐ SUBSYSTEM ☐ MODULE	NAME: _____ _____ _____	
I. <u>DATA COLLECTION WORKSECTION:</u> 1.0 <u>Data and Control Flow Complexity (81)</u> 1.1 What is the sum of the number of decision points, subdecision points, conditional branches and unconditional branches? Score = 1 + 1.1 + 1		SCORE
II. <u>METRIC WORKSECTION:</u> Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$		
III. <u>EVALUATION WORKSECTION:</u> What is your evaluation of the reviewed products based on the data elements above? (1-10) _____ (0 If you are unable to evaluate)		
IV. <u>INSPECTOR'S COMMENTS:</u> 		

PREPARED BY: _____ APPROVED BY: _____
 DATE: _____ DATE: _____

DESIGN STRUCTURE MEASURE

Form Code: ReDDM.6

LIFE CYCLE PHASE:

DETAIL DESIGN

SOURCE(S):

☐ SYSTEM

NAME: _____

☐ SUBSYSTEM

☐ MODULE

I. DATA COLLECTION WORKSECTION:

SCORE

1.0 Module Processing not Dependent on Prior Processing (82)

1.1 Is the module independent of knowledge of prior processing? Y | N

Yes = 1, No = 0

2.0 Entrance and Exit of the Module (83)

2.1 Number of entrances into modules.

2.2 Number of Exits from module.

Score = $1 + \left[\frac{2.1}{1} + 1 \right] + \left[1 + \left[\frac{2.2}{1} + 1 \right] \right]$

3.0 Description of Input, Output, Processing and Limitations (138)

3.1 Does each module description include input, output, processing and limitations? Y | N

Yes = 1, No = 0

II. METRIC WORKSECTION:

Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the data elements above? (1-10) _____ (Ø If you are unable to evaluate)

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

ERROR TOLERANCE

Form Code: ReDDC.1

LIFE CYCLE PHASE:

DETAIL DESIGN

SOURCE(S):

ReDDM.1

ReDDM.2

☐ SYSTEM

NAME: _____

☐ SUBSYSTEM

☐ MODULE

ReDDM.3

I. METRIC SUMMARY WORKSECTION:

1. Error Tolerance Control Checklist
2. Recovery from Improper Input Data Checklist
3. Recovery from Computational Failure Checklist

SCORE

☐
☐
☐

II. CRITERIA WORKSECTION:

Criteria Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Metrics}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the metrics above?
(1-10) _____ (§ If you are unable to evaluate)

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

<u>ACCURACY</u>		
		Form Code: <u>ReDDC.2</u>
LIFE CYCLE PHASE: DETAIL DESIGN		SOURCE(S): <u>ReDDM.4</u>
☐ SYSTEM ☐ SUBSYSTEM ☐ MODULE	NAME: _____ _____ _____	
I. <u>METRIC SUMMARY WORKSECTION:</u> 1. Accuracy Checklist		SCORE ☐
II. <u>CRITERIA WORKSECTION:</u> $\text{Criteria Value} = \frac{\text{Sum of Above Scores}}{\text{No. of Metrics}}$		☐
III. <u>EVALUATION WORKSECTION:</u> What is your evaluation of the reviewed products based on the metrics above? (1-10) _____ (§ If you are unable to evaluate)		

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

SIMPLICITY

Form Code: ReDDC.3

LIFE CYCLE PHASE:

DETAIL DESIGN

SOURCE(S):

ReDEM.6

ReDDM.5

☐

SYSTEM

NAME: _____

☐

SUBSYSTEM

☐

MODULE

I. METRIC SUMMARY WORKSECTION:

1. Complexity Measure

2. Design Structure Measure

SCORE

☐☐

II. CRITERIA WORKSECTION:

Criteria Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Metrics}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the metrics above?
(1-10) _____ (§ If you are unable to evaluate)

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

RELIABILITY

Form Code: ReDDF.1

LIFE CYCLE PHASE:

DETAIL DESIGN

SOURCE(S):

ReDDC.1

ReDDC.2

☐ SYSTEM

NAME: _____

☐ SUBSYSTEM

ReDDC.3

☐ MODULE

I. CRITERIA SUMMARY WORKSECTION:

1. Error Tolerance

2. Accuracy

3. Simplicity

SCORE

☐☐☐

II. FACTOR WORKSECTION:

Factor Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Criteria}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the criteria above?
(1-10) _____ (If you are unable to evaluate)

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

RELIABILITY

Complete this score chart if application of this set of worksheets is appropriate when products of A1, A2, A3, A4, B and D in Design Phase become available.

<u>Data Element Number</u>	<u>Answer of Data Element</u>	<u>Data Element Score</u>	<u>Metric Score</u>	<u>Criteria Score</u>	<u>Factor Score</u>
<u>72</u>					
<u>74</u>					
<u>75</u>					
<u>76</u>					
<u>77</u>					
<u>78</u>					
<u>79</u>					
<u>80</u>					
<u>73</u>					
<u>81</u>					
<u>82</u>					
<u>83</u>					
<u>138</u>					

FIRST MEASUREMENT

Date _____

AD-A120 376

SYSTEMS ARCHITECTS INC RANDOLPH MASS
COMPUTER SYSTEMS ACQUISITION METRICS HANDBOOK. VOLUME II. QUALI--ETC(U)
MAY 82 F19688-88-C-0887

F/O 9/8

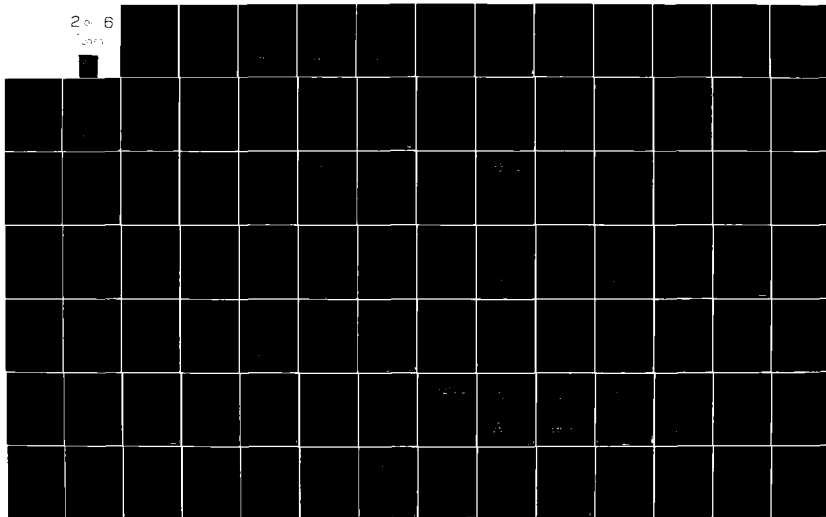
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EDS-TR-88-143(2)

NL

2 of 6

Page 1



RELIABILITY

Complete this score chart if application of this set of worksheets is appropriate when products of C in Coding and Checkout Phase is available.

<u>Data Element Number</u>	<u>Answer of Data Element</u>	<u>Data Element Score</u>	<u>Metric Score</u>	<u>Criteria Score</u>	<u>Factor Score</u>
<u>72</u>					
<u>74</u>					
<u>75</u>					
<u>76</u>					
<u>77</u>					
<u>78</u>					
<u>79</u>					
<u>80</u>					
<u>73</u>					
<u>81</u>					
<u>82</u>					
<u>83</u>					
<u>138</u>					

SECOND MEASUREMENT

Date _____

RELIABILITY

Complete this score chart if a third application of this set of worksheets is appropriate for update when products of B-D3, B-D4 in Test and Integration phase become available.

<u>Data Element Number</u>	<u>Answer of Data Element</u>	<u>Data Element Score</u>	<u>Metric Score</u>	<u>Criteria Score</u>	<u>Factor Score</u>
<u>72</u>					
<u>74</u>					
<u>75</u>					
<u>76</u>					
<u>77</u>					
<u>78</u>					
<u>79</u>					
<u>80</u>					
<u>73</u>					
<u>81</u>					
<u>82</u>					
<u>83</u>					
<u>138</u>					

THIRD MEASUREMENT

Date _____

ERROR TOLERANCE CHECKLIST

Form Code: ReIMM.1

LIFE CYCLE PHASE:

IMPLEMENTATION

SOURCE(S):

☐ SYSTEM

NAME: _____

☐ SUBSYSTEM

☐ MODULE

I. DATA COLLECTION WORKSECTION:

SCORE

1.0 Detected Error Condition (72)

1.1 When an error condition is detected,
is it passed to the calling module?

☐ Y ☐ N

Yes = 1, No = 0

☐

II. METRIC WORKSECTION:

Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$

☐

**III. EVALUATION WORKSECTION: What is your evaluation of the
reviewed products based on the data elements above?
(1-10) _____ (Ø If you are unable to evaluate)**

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

RECOVERY FROM IMPROPER INPUT DATA CHECKLIST

Form Code: ReIMM.2

LIFE CYCLE PHASE:		SOURCE(S):	
IMPLEMENTATION			
☐ SYSTEM	NAME: _____		
☐ SUBSYSTEM	_____		
☐ MODULE	_____		

I. DATA COLLECTION WORKSECTION:			SCORE
1.0 Value of Input Ranges (74)			
1.1 Are values of inputs range tested?	☐ Y ☐ N	Yes = 1, No = 0	☐
2.0 Redundant Input Data (75)			
2.1 Are conflicting requests and illegal combinations identified and checked?	☐ Y ☐ N	Yes = 1, No = 0	☐
3.0 Sufficiency of Input Data (76)			
3.1 Is there a check to see if all necessary data is available before processing begins?	☐ Y ☐ N	Yes = 1, No = 0	☐
4.0 Input Checking (77)			
4.1 Is all input checked, reporting all errors, before processing begins?	☐ Y ☐ N	Yes = 1, No = 0	☐

II. METRIC WORKSECTION:	Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$	☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the data elements above? (1-10) _____ (# If you are unable to evaluate)

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

RECOVERY FROM COMPUTATIONAL FAILURES CHECKLIST

Form Code: ReIMM.3

LIFE CYCLE PHASE: IMPLEMENTATION		SOURCE(S): 	
☐ SYSTEM ☐ SUBSYSTEM ☐ MODULE	NAME: _____ _____ _____		

I. <u>DATA COLLECTION WORKSECTION:</u>	SCORE
1.0 <u>Range Test for Loop and Multiple Transfer Index Parameters (78)</u> 1.1 Are loop and multiple transfer index parameters range tested before use? Y N Yes = 1, No = 0	
2.0 <u>Subscript Checking (79)</u> 2.1 Are subscript values range tested before use? Y N Yes = 1, No = 0	
3.0 <u>Output Checking (80)</u> 3.1 Is output checked for reasonableness before processing continues? Y N Yes = 1, No = 0	

II. <u>METRIC WORKSECTION:</u> Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$	

III. <u>EVALUATION WORKSECTION:</u> What is your evaluation of the reviewed products based on the data elements above? (1-10) _____ (# If you are unable to evaluate)

IV. <u>INSPECTOR'S COMMENTS:</u>

PREPARED BY: _____ APPROVED BY: _____
 DATE: _____ DATE: _____

<u>ACCURACY CHECKLIST</u>			Form Code: <u>ReIMM.4</u>
LIFE CYCLE PHASE: IMPLEMENTATION		SOURCE(S): 	
☐ SYSTEM ☐ SUBSYSTEM ☐ MODULE	NAME: _____ _____ _____		
I. <u>DATA COLLECTION WORKSECTION:</u>			SCORE
1.0 <u>Execution Outputs (133)</u> 1.1 During execution are outputs within accuracy tolerance? Y N			
Yes = 1, No = 0			
II. <u>METRIC WORKSECTION:</u>			
Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$			
III. <u>EVALUATION WORKSECTION:</u> What is your evaluation of the reviewed products based on the data elements above? (1-10) _____ (Ø If you are unable to evaluate)			
IV. <u>INSPECTOR'S COMMENTS:</u>			

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

DESIGN STRUCTURE MEASURE

Form Code: ReIMM.5

LIFE CYCLE PHASE:

IMPLEMENTATION

- ☐ SYSTEM
☐ SUBSYSTEM
☐ MODULE

NAME: _____

SOURCE(S):

I. DATA COLLECTION WORKSECTION:

SCORE

1.0 Entrance and Exit of the Module (83)

1.1 Number of entrances into modules.

1.2 Number of exits from module.

$$\text{Score} = \left[1 \div (\boxed{1.1} + 1) \right] + \left[1 \div (\boxed{1.2} + 1) \right]$$

II. METRIC WORKSECTION:

Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the data elements above?
(1-10) _____ (§ If you are unable to evaluate)

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

COMPLEXITY MEASURE

Form Code: ReIMM.6

LIFE CYCLE PHASE:

IMPLEMENTATION

- ☐ SYSTEM
☐ SUBSYSTEM
☐ MODULE

NAME: _____

SOURCE(S):

I. DATA COLLECTION WORKSECTION:

SCORE

1.0 Data and Control Flow Complexity (81)

1.1 What is the sum of the number of
decision points, subdecision points,
conditional branches and uncondi-
tional branches?

Score = 1 +

$\boxed{1.1} + 1$

II. METRIC WORKSECTION:

Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$

III. EVALUATION WORKSECTION: What is your evaluation of the
reviewed products based on the data elements above?
(1-10) _____ (Ø If you are unable to evaluate)

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

CODING SIMPLICITY MEASURE

Form Code: ReIMM.7

LIFE CYCLE PHASE:

IMPLEMENTATION

SOURCE(S):

☐ SYSTEM

NAME: _____

☐ SUBSYSTEM

☐ MODULE

I. DATA COLLECTION WORKSECTION:

SCORE

1.0 Negative Boolean or Compound Boolean Expressions (106)

1.1 Number of negative or complicated compound Boolean expressions.

1.2 Number of lines excluding comments.

$$\text{Score} = 1 - (\boxed{1.1} \div \boxed{1.2})$$

2.0 Statement Labels (108)

2.1 Number of statement labels?
(Do not count format statements)

2.2 Number of lines excluding comments
(Executable statements)

$$\text{Score} = 1 - (\boxed{2.1} \div \boxed{2.2})$$

3.0 Nesting Level (109)

3.1 Maximum nesting level?

$$\text{Score} = 1 + \boxed{3.1}$$

4.0 Conditional Branches (110)

4.1 Number of conditional branches?

4.2 Number of executable statements?

$$\text{Score} = \boxed{4.1} + \boxed{4.2}$$

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

CODING SIMPLICITY MEASURE (Continued)

Form Code: ReIMM.7

LIFE CYCLE PHASE:

IMPLEMENTATION

SOURCE(S):

☐ SYSTEM

NAME: _____

☐ SUBSYSTEM

☐ MODULE

I. DATA COLLECTION WORKSECTION (continued):

SCORE

5.0 Unconditional Branches (111)

5.1 Number of unconditional branches.

5.2 Number of executable statements.

$$\text{Score} = 1 - \left(\frac{\boxed{5.1}}{\boxed{5.2}} \right)$$

6.0 In and Out of Loops (112)

6.1 Number of one entrance/
one exit loops.

6.2 Total Number of loops.

$$\text{Score} = \boxed{6.1} + \boxed{6.2}$$

7.0 Loop Index (113)

7.1 Number of loop indices that are
modified.

7.2 Total number of loops.

$$\text{Score} = 1 - \left(\frac{\boxed{7.1}}{\boxed{7.2}} \right)$$

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

CODING SIMPLICITY MEASURE (Continued)

Form Code: ReIMM.7

LIFE CYCLE PHASE:
IMPLEMENTATION

SOURCE(S):

- ☐ SYSTEM
☐ SUBSYSTEM
☐ MODULE

NAME: _____

I. DATA COLLECTION WORKSECTION (continued):

SCORE

8.0 Module Flow Top to Bottom (115)

8.1 Is flow top to bottom?
(There should not be any backward
branching GOTOs)

☐ Y ☐ N

Yes = 1, No = 0

☐

9.0 Local Variables (128)

9.1 Number of local variables

9.2 Number of variables (local and global)

Score = 9.1 + 9.2

☐

II. METRIC WORKSECTION:

Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the
reviewed products based on the data elements above?
(1-10) _____ (§ If you are unable to evaluate)

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

ERROR TOLERANCE

Form Code: ReIMC.1

LIFE CYCLE PHASE:

IMPLEMENTATION

- ☐ SYSTEM
☐ SUBSYSTEM
☐ MODULE

NAME: _____

SOURCE(S):

ReIMM.1

ReIMM.2

ReIMM.3

I. METRIC SUMMARY WORKSECTION:

1. Error Tolerance Checklist
2. Recovery from Improper Input Data Checklist
3. Recovery from Computational Failures Checklist

SCORE

☐
☐
☐

II. CRITERIA WORKSECTION:

Criteria Value $\frac{\text{Sum of Above Scores}}{\text{No. of Metrics}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the metrics above?
(1-10) _____ (§ If you are unable to evaluate)

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

<u>ACCURACY</u>		
		Form Code: <u>ReIMC.2</u>
LIFE CYCLE PHASE: IMPLEMENTATION		SOURCE(S): <u>ReIMM.4</u>
☐ SYSTEM ☐ SUBSYSTEM ☐ MODULE	NAME: _____ _____ _____	
I. <u>METRIC SUMMARY WORKSECTION:</u> 1. Accuracy Checklist		SCORE ☐
II. <u>CRITERIA WORKSECTION:</u> $\text{Criteria Value} = \frac{\text{Sum of Above Scores}}{\text{No. of Metrics}}$		☐
III. <u>EVALUATION WORKSECTION:</u> What is your evaluation of the reviewed products based on the metrics above? (1-10) _____ (Ø If you are unable to evaluate)		

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

SIMPLICITY

Form Code: ReIMC.3

LIFE CYCLE PHASE:

IMPLEMENTATION

SOURCE(S):

ReIMM.5

ReIMM.6

☐

SYSTEM

NAME: _____

☐

SUBSYSTEM

☐

MODULE

ReIMM.7

I. METRIC SUMMARY WORKSECTION:

1. Design Structure Measure
2. Complexity Measure
3. Coding Simplicity Measure

SCORE

☐☐☐

II. CRITERIA WORKSECTION:

Criteria Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Metrics}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the metrics above?
(1-10) _____ (Ø If you are unable to evaluate)

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

<u>RELIABILITY</u>			Form Code: <u>ReIMF.1</u>
LIFE CYCLE PHASE: IMPLEMENTATION		SOURCE(S): <u>ReIMC.1</u> <u>ReIMC.2</u>	
☐ SYSTEM ☐ SUBSYSTEM ☐ MODULE	NAME: _____ _____ _____	_____ <u>ReIMC.3</u> _____	
I. <u>CRITERIA SUMMARY WORKSECTION:</u> 1. Error Tolerance 2. Accuracy 3. Simplicity			SCORE
II. <u>FACTOR WORKSECTION:</u> $\text{Factor Value} = \frac{\text{Sum of Above Scores}}{\text{No. of Criteria}}$			
III. <u>EVALUATION WORKSECTION:</u> What is your evaluation of the reviewed products based on the criteria above? (1-10) _____ (§ If you are unable to evaluate)			

PREPARED BY: _____ APPROVED BY: _____
 DATE: _____ DATE: _____

RELIABILITY

Complete this score chart if application of this set of worksheets is appropriate for update when products of A and B in Coding and Checkout Phase are available.

<u>Data Element Number</u>	<u>Answer of Data Element</u>	<u>Data Element Score</u>	<u>Metric Score</u>	<u>Criteria Score</u>	<u>Factor Score</u>
<u>72</u>					
<u>74</u>					
<u>75</u>					
<u>76</u>					
<u>77</u>					
<u>78</u>					
<u>79</u>					
<u>80</u>					
<u>133</u>					
<u>83</u>					
<u>81</u>					
<u>106</u>					
<u>108</u>					
<u>109</u>					
<u>110</u>					
<u>111</u>					
<u>112</u>					
<u>113</u>					
<u>115</u>					
<u>128</u>					

FIRST MEASUREMENT

Date

RELIABILITY

Complete this score chart if application of this set of worksheets is appropriate when products of B-D2 in Test and Integration Phase is available.

Data Element Number	Answer of Data Element	Data Element Score	Metric Score	Criteria Score	Factor Score
<u>72</u>					
<u>74</u>					
<u>75</u>					
<u>76</u>					
<u>77</u>					
<u>78</u>					
<u>79</u>					
<u>80</u>					
<u>133</u>					
<u>83</u>					
<u>81</u>					
<u>106</u>					
<u>108</u>					
<u>109</u>					
<u>110</u>					
<u>111</u>					
<u>112</u>					
<u>113</u>					
<u>115</u>					
<u>126</u>					

SECOND MEASUREMENT Date _____

RELIABILITY

Complete this score chart if application of this set of worksheets is appropriate when products of B-D2 in Test and Integration Phase is available.

Data Element Number	Answer of Data Element	Data Element Score	Metric Score	Criteria Score	Factor Score
<u>72</u>					
<u>74</u>					
<u>75</u>					
<u>76</u>					
<u>77</u>					
<u>78</u>					
<u>79</u>					
<u>80</u>					
<u>133</u>					
<u>83</u>					
<u>81</u>					
<u>106</u>					
<u>108</u>					
<u>109</u>					
<u>110</u>					
<u>111</u>					
<u>112</u>					
<u>113</u>					
<u>115</u>					
<u>128</u>					

Date

THIRD MEASUREMENT

QUALITY FACTOR

MODULE NO. 3

EFFICIENCY

TABLE OF CONTENTS

<u>TITLE</u>	<u>PAGE</u>
<u>INTRODUCTION AND INSTRUCTIONS FOR EFFICIENCY MODULE</u>	
INTRODUCTION TO EFFICIENCY.	Ef-1
STEPS FOR COMPLETING WORKSHEETS	Ef-5
STEPS FOR UPDATE APPLICATIONS	Ef-8
HOW TO USE SCORE CHART SETS	Ef-9
ESD PRODUCTS FOR ANALYSIS PHASE	Ef-12
ESD PRODUCTS FOR DESIGN PHASE	Ef-13
ESD PRODUCTS FOR CODING AND CHECKING PHASE. .	Ef-14
ESD PRODUCTS FOR TEST AND INTEGRATION PHASE .	Ef-15
 <u>QUALITY FACTOR NO. 3 EFFICIENCY WORKSHEETS</u>	
WORKSHEETS FOR REQUIREMENTS ANALYSIS PHASE. .	Ef-16
WORKSHEETS FOR PRELIMINARY DESIGN PHASE . . .	Ef-20
WORKSHEETS FOR DETAIL DESIGN PHASE.	Ef-28
WORKSHEETS FOR IMPLEMENTATION PHASE	Ef-34

This QUALITY FACTOR MODULE is one of a set of eleven modules that are components of the "COMPUTER SYSTEMS ACQUISITION METRICS HANDBOOK".

INTRODUCTION AND INSTRUCTIONS
FOR
EFFICIENCY MODULE

INTRODUCTION TO EFFICIENCY

The Quality Factor Efficiency represents a measure of the amount of computing resources and code required by a program to perform a function. FIGURES Ef - 1 through EF - 4 represent the hierarchy of Metric, Criteria and Quality Factor worksheets associated with Efficiency in Requirements Analysis, Preliminary Design, Detailed Design and Implementation phases of the Software Development Life Cycle.

The worksheets in this module are grouped into four separate sets, one set for each Life Cycle phase. Each set consists of Metric worksheets, Criteria worksheets, a Factor worksheet and score charts.

METRIC WORKSHEETS

One or more DATA COLLECTION WORKSECTIONS which contain the data element scores for each Metric, and each Metric's Final Score.

CRITERIA WORKSHEETS

One or more METRIC SUMMARY WORKSECTIONS which contain the Metrics scores for each Criteria, and each Criteria's Final Score.

FACTOR WORKSHEETS

One CRITERIA SUMMARY WORKSECTION which contains each Criteria's score, and the Final Score for the Factor for that phase.

SCORE CHARTS:

One or more charts that record worksheet values throughout the Life Cycle.

However, the sequence in which the worksheet sets are applied is dependent on the availability of ESD Computer Program Life Cycle products. Usually the worksheets will be applied sequentially, except for updates.

These instructions show when the Efficiency worksheet sets and Score Charts are applied during the Computer Program Life Cycle. The Product Code referred to on the Score Charts is the code defined in the ESD Guidebook Series, Software Acquisition Management Guidebook, Life Cycle Events and reillustrated in the General Instructions. The Product Tables map the ESD Computer Program Life Cycle Products to the Metric Worksheets. The balance of these instructions are step-by-step procedures for completing the worksheets and score chart summaries.

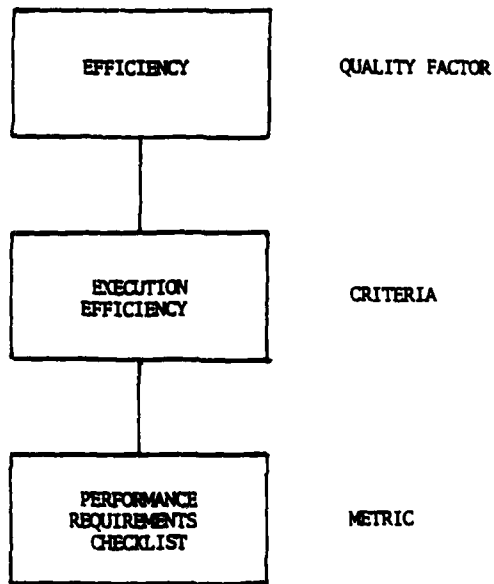


FIGURE Ef-1
REQUIREMENTS ANALYSIS WORKSHEET HIERARCHY

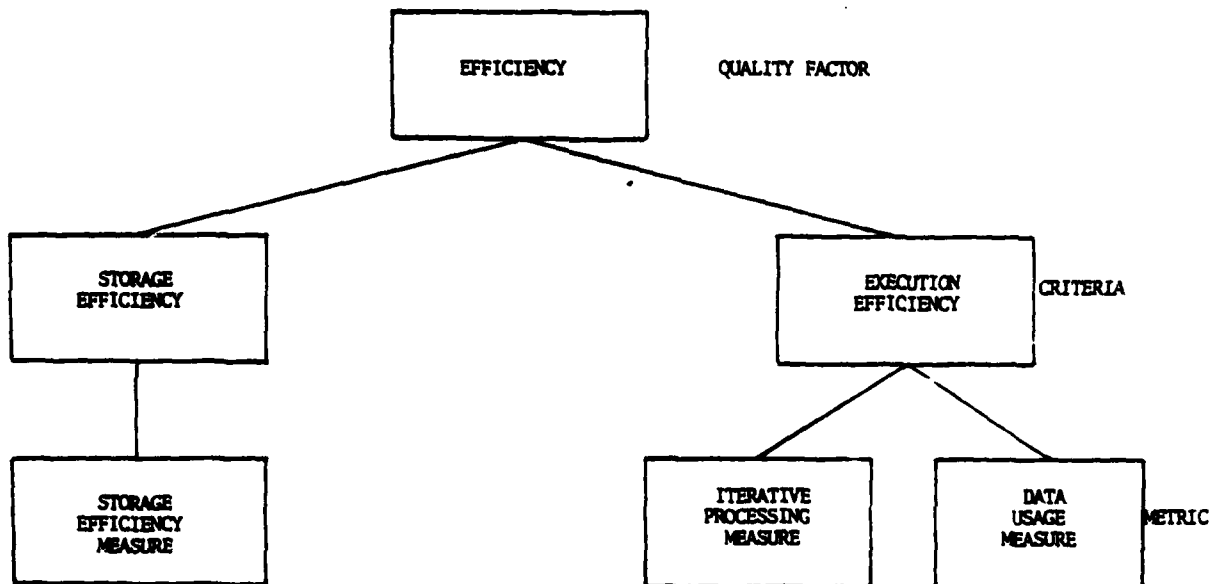


FIGURE Ef-2
PRELIMINARY DESIGN WORKSHEET HIERARCHY

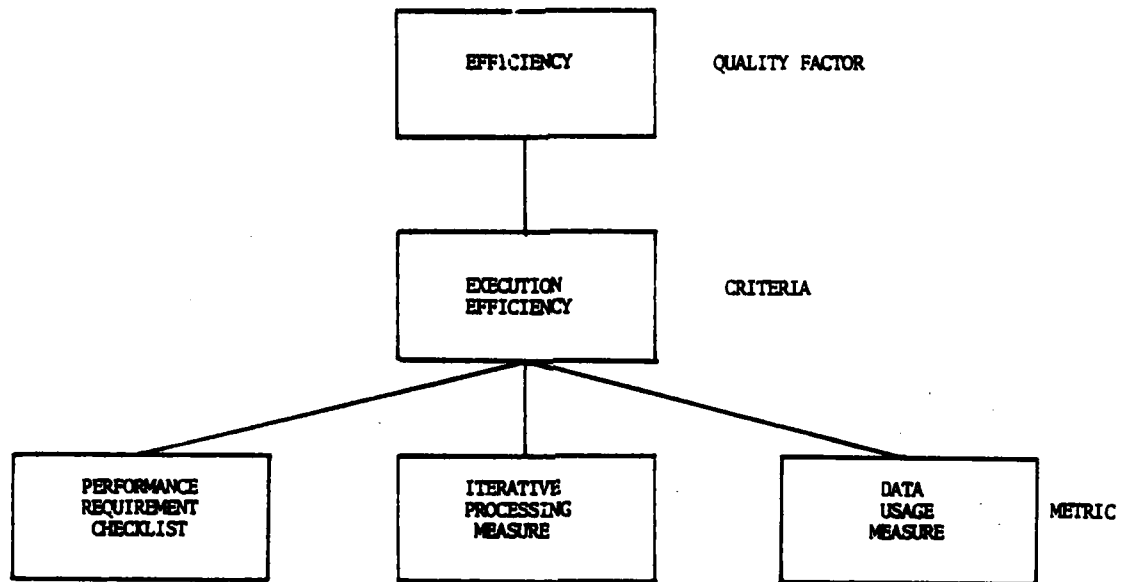


FIGURE Ef-3
DETAILED DESIGN WORKSHEET HIERARCHY

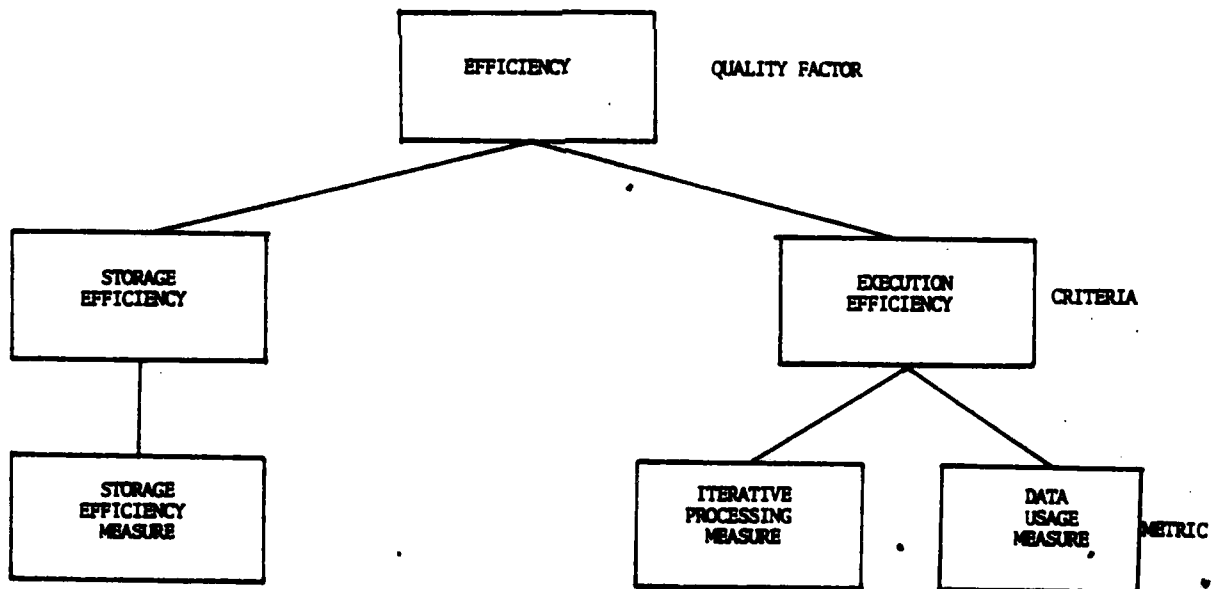


FIGURE Ef-4
IMPLEMENTATION WORKSHEET HIERARCHY

STEPS FOR COMPLETING WORKSHEETS

Step 1

Enter the appropriate information in the following blocks:

- (1.1) SYSTEM/SUBSYSTEM/MODULE block-Indicate the level of application.
- (1.2) NAME block-List the name of the system being measured.
- (1.3) SOURCE block-On Metric Worksheets, list the source document.
- (1.4) The PREPARED BY and DATE blocks should contain the name of the person performing the software metrics, and the current date.

Step 2

Determine the current Computer Program Life Cycle Phase. This module is concerned with four phases of the Computer Program Life Cycle:

- (2.1) Requirements Analysis
- (2.2) Preliminary Design
- (2.3) Detail Design
- (2.4) Implementation

Step 3

Determine the available products from the phase and which data worksheet set to apply. Each Life Cycle phase has at least three different activities associated with it. The result of the completion of an activity is one or more documents called products.

Before a worksheet set can be applied, specific products associated with it must be obtained. The Product Tables, at the end of the instructions, detail the products required for each worksheet set.

Step 4 - METRIC WORKSHEETS

- (4.1) Answer each question in the Data Collection Worksection as it applies to the system/subsystem/module you are measuring and transfer its scored value to its corresponding SCORE block.

If the question calls for a YES/NO type response, a YES answer is scored at a 1.
a NO answer is scored as a 0.

The questions that call for a numeric quantity type response have specific instructions on how to score the response. Follow the instructions under each data element.

- (4.2) Find the Metric Value by following the algorithm on the worksheet.
- (4.3) Answer the Evaluation Worksection - evaluate the products based on the data elements as they apply to the system.
- (4.4) When you have repeated this procedure for all the Metric Worksheets in the set, you are ready to use the Criteria Worksheets.

Step 5 - CRITERIA WORKSHEETS

- (5.1) Each numbered item in the Metric Summary Worksection represents an individual Metric Value.

- (5.2) Find the Form Code in the SOURCE box of the Criteria Worksheet.
- (5.3) Find the Metric Worksheet with the same Form Code and transfer its Metric Value into the box to the right of the item in the Criteria Worksheet.
- (5.4) Repeat this process for all items in the Metric Summary Worksection.
- (5.5) Find the Criteria Value by following the algorithm on the worksheet.
- (5.6) Answer the Evaluation Worksection - evaluate the products based on the Metrics as they apply to the system.

Step 6 - FACTOR WORKSHEETS

- (6.1) Each numbered item in the Criteria Summary Worksection represents an individual Criterion Value.
- (6.2) Find the Form Code in the SOURCE box of the Factor Worksheet.
- (6.3) Find the Criteria Worksheet with the same Form Code and transfer its Criteria Value into the box in the Score column in the Factor Worksheet.
- (6.4) Repeat this process for all items in the Criteria Summary Worksection.
- (6.5) Answer the Evaluation Worksection - evaluate the products based on the Criteria as they apply to the system.
- (6.6) Find the Factor Value by following the algorithm on the Worksheet.

STEPS FOR UPDATE APPLICATIONS

Step 1

Determine the update necessary. The Product Tables at the end of these instructions list the updates required and the activities and products associated with each update. Also review Section 2.3.2, "Update Information Requirements", in the General Instructions Handbook for further information if necessary.

Step 2

Obtain the required products. The Products Tables at the end of these Instructions list the products required for each update application.

Step 3

Reapply the Metric, Criteria, and Factor worksheets by following the procedure already outlined in "Steps for Completing Worksheets", of these Instructions. "How to Use Score Chart sets", explains the procedure for reporting the update scores.

HOW TO USE SCORE CHART SETS

When you apply worksheets to system/subsystem/module, you must apply some worksheets more than once in the Computer Program Life Cycle. Because of this, a Score Chart set is organized so that the groups of worksheet scores, acquired at the times a set of worksheets is applied, can be recorded separately: originals & updates.

The Score Chart set (at the end of each worksheet set) is composed of similar tree structure diagrams. Each Score Chart represents the complete hierarchy of scores to be acquired during any one application of worksheets sets in the Life Cycle.

When applying any worksheet, in order to record scores you must locate and use the Score Chart that corresponds to the current phase in the Life Cycle. In a Score Chart set, the first Score Chart (labeled FIRST MEASUREMENT) is designed to receive the scores from the first application of a worksheet set in the Life Cycle, and the following charts (i.e., labeled SECOND MEASUREMENT, etc.) are designed to receive the scores from the updates.

Each data element in the Metrics Worksheet has a unique number in the Data Element Dictionary, which is listed in the first column in the Score Chart. The next two columns of boxes in a Score Chart show a worksheet set's individual data element raw scores and its interpreted response (Yes/No, = 1 or 0, etc.). The last three box columns map out the Metric, Criteria and Factor worksheets of a set, each box representing the total score of a corresponding worksheet.

Once you have finished scoring a Worksheet set and located the corresponding Score Chart set, use the following procedure for filling out the Score Chart:

Step 1 - ANSWER OF DATA ELEMENT/DATA ELEMENT SCORE

For each data element in a Metric Worksheet:

- (1.1) Reference its number in the "Data Element Number" Column in the Score Chart.
- (1.2) Transfer the answers you gave to the questions in the Data Collection Worksection to the corresponding box under the column headed "Answer of Data Element"
- (1.3) Transfer the Scores of the data element from the Data Collection Worksection to its corresponding box under column labeled "Data Element Score".
- (1.4) Repeat this step for all data elements within this phase.

Step 2 - METRIC SCORE

Each box in this column represents the Score from the Metric Worksection of a Metric Worksheet. Transfer the Metric Value from each Metric Worksheet into the corresponding boxes in the Score Chart's Metric Score Column.

Step 3 - CRITERIA SCORE

Each box in this column represents the score from the Criteria Worksection of a Criteria Worksheet into the corresponding boxes of the Score Chart's Criteria Score Column.

Step 4 - FACTOR SCORE

Each box in this column represents the score from the Factor Worksection of a Quality Factor Worksheet. Transfer the Factor from the set's Factor Worksheet into corresponding boxes of the Score Chart's Factor Score Column.

These Score Chart sets will provide a historical base for repeated application of the metrics to a system at all levels. They are also a useful means of reporting your finds to the program manager in a condensed and compact form.

PRODUCTS	TRADE-OFF STUDY REPORTS	INITIAL OR AUTHENTICATED SYSTEM SPEC, SEGMENT SPEC	AUTHENTICATED DEVELOPMENT SPEC FOR CPCI	HIGHER LEVEL SPEC	DRAFT PRODUCT SPECS	PDR MINUTES AND ACTION ITEM RESPONSES
WORKSHEET SET TO BE APPLIED	REQUIREMENTS ANALYSIS WORKSHEETS				PRELIMINARY DESIGN WORKSHEETS	

ESD PRODUCTS FOR ANALYSIS PHASE

Apply the Requirement Analysis Worksheets as the following types of products become available. See note below.

- Product A.1 - Trade-off Study Reports
- Product A.2 - Initial or Authenticated System Specification & Segment Specification (if any)
- Product B.1 - Authenticated Development Specification for each CPCI
- Product B.2 - Possible higher-level specification, ICD and changes

Apply the Preliminary Design Worksheets as the following types of products become available. See note below.

- Product B.3 - Parts of draft Product Specifications containing design approaches for each CPCI
- Product C. - PDR minutes and action item responses

NOTE: If these products do not contain the information requested by the Data Element questions, other contractor-supplied information should be searched.

PRODUCTS	FUNCTIONAL FLOW CHARTS	DE- TAILED FLOW CHART	DATA FORMAT DESC.	ALGO- RITHM DESC.	PRELIMI- NARY PRODUCT DESC.	CDR MINUTES ACTION ITEM RESPON- SES	SYSTEM SEG- MENT TEST PLANS	PRELIM. CPCI TEST PRO- CEDURES
WORKSHEET SET TO BE APPLIED	DETAILED DESIGN WORKSHEETS						PRELIMINARY DESIGN WORKSHEETS, (UPDATE)	

ESD PRODUCTS FOR DESIGN PHASE

Apply the Detailed Design Worksheets as the following types of products become available. See note below.

- Product A.1: Functional flowcharts
- Product A.2: Detailed flowcharts
- Product A.3: Data format descriptions
- Product A.4: Descriptions of algorithms not previously prescribed
- Product B. : Preliminary Product Specifications, including the above
- Product D. : CDR minutes & action item responses

Apply the Preliminary Design Worksheets for Update as the following types of products become available. See note.

- Product C.1: System, Segment and CPCI Test Plans
- Product C.2: Preliminary CPCI Test Procedures

NOTE: If these products do not contain the information requested by the Data Element questions, other contractor-supplied information should be searched.

PRODUCTS	CODE	ALTERED PRODUCT SPECS
WORKSHEET SET TO BE APPLIED	IMPLEMENTATION WORKSHEETS	DETAILED DESIGN WORKSHEETS (UPDATE)

ESD PRODUCTS FOR CODING AND CHECKING PHASE

Apply the Implementation Worksheets as the code becomes available.

Apply the Detailed Design Worksheets for Update as the following types of products become available. See note below.

- Product C. - Altered Product Specifications, including compiler/assembly listings.

NOTE: If these products do not contain the information requested by the Data Element questions, other contractor-supplied information should be searched.

PRODUCTS	FINAL CPCI TEST PROCEDURES	SEGMENT & SYSTEM LEVEL TEST PROCEDURES	TEST REPORTS	CODING CHANGES	MODIFIED PRODUCT SPECS	HIGH LEVEL SPECS
WORKSHEET SET TO BE APPLIED	PRELIMINARY DESIGN WORKSHEETS			IMPLEMEN- TATION WORKSHEETS	DETAILED DESIGN WORKSHEETS (UPDATE)	

ESD PRODUCTS FOR TEST AND
INTEGRATION PHASE

Apply the Preliminary Design Worksheets for Update as the following types of products become available. See note below.

- A Product 1: Final CPCI Test Procedures
- Product 2: Segment (if any) and system-level Test Procedures

- B-D Product 1: Test Reports

Apply the Implementation Worksheets for Update as the following types of products become available. See note below.

- B-D Product 2: Computer Program Coding Changes

Apply the Detailed Design Worksheets for Update as the following types of products become available. See note.

- B-D Product 3: Modified Product Specification
- Product 4: Possible high-level specification, ICD and changes.

NOTE: If these products do not contain the information requested by the Data Element questions, other contractor-supplied information should be searched.

PERFORMANCE REQUIREMENTS CHECKLIST

Form Code: Efram.1

LIFE CYCLE PHASE:
REQUIREMENTS ANALYSIS

SOURCE(S):

- ☐ SYSTEM
☐ SUBSYSTEM
☐ MODULE

NAME: _____

I. DATA COLLECTION WORKSECTION:

SCORE

1.0 Performance Requirements (26)

1.1 Have performance requirements (storage and run time) been identified in the Requirements Analysis Phase for the functions to be performed?

☐ Y ☐ N

Yes = 1, No = 0

☐

II. METRIC WORKSECTION:

Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the data elements above?
(1-10) _____ (§ If you are unable to evaluate)

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

EXECUTION EFFICIENCY		
		Form Code: <u>EFRAC.1</u>
LIFE CYCLE PHASE: REQUIREMENTS ANALYSIS		SOURCE(S): <u>EFRAM.1</u>
☐ SYSTEM ☐ SUBSYSTEM ☐ MODULE	NAME: _____ _____ _____	
I. <u>METRIC SUMMARY WORKSECTION:</u> 1. Performance Requirements Checklist		SCORE ☐
II. <u>CRITERIA WORKSECTION:</u> $\text{Criteria Value} = \frac{\text{Sum of Above Scores}}{\text{No. of Metrics}}$		☐
III. <u>EVALUATION WORKSECTION:</u> What is your evaluation of the reviewed products based on the metrics above? (1-10) _____ (§ If you are unable to evaluate)		

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

EFFICIENCY

Form Code: EfRAF.1

LIFE CYCLE PHASE:

REQUIREMENTS ANALYSIS

SOURCE(S):

EfRAC.1

☐

SYSTEM

NAME: _____

☐

SUBSYSTEM

☐

MODULE

I. CRITERIA SUMMARY WORKSECTION:

1. Execution Efficiency

SCORE

☐

II. FACTOR WORKSECTION:

Factor Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Criteria}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the criteria above?
(1-10) _____ (Ø If you are unable to evaluate)

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

EFFICIENCY

Complete this score chart if an application of this set of worksheet is appropriate when products of A1, A2, B1 and B2 in Analysis phase become available:

<u>Data Element Number</u>	<u>Answer of Data Element</u>	<u>Data Element Score</u>	<u>Metric Score</u>	<u>Criteria Score</u>	<u>Factor Score</u>

26

	—		—		—		—	

FIRST MEASUREMENT

Date _____

Complete this score chart if a second application of this set of worksheets is appropriate for update when products of A1, A2, B1 and B2 in analysis phase are available:

<u>Data Element Number</u>	<u>Answer of Data Element</u>	<u>Data Element Score</u>	<u>Metric Score</u>	<u>Criteria Score</u>	<u>Factor Score</u>

26

	—		—		—	

SECOND MEASUREMENT

Date _____

STORAGE EFFICIENCY MEASURE

Form Code: EfPDM.1

LIFE CYCLE PHASE:

PRELIMINARY DESIGN

SOURCE(S):

- ☐ SYSTEM
☐ SUBSYSTEM
☐ MODULE

NAME: _____

I. DATA COLLECTION WORKSECTION:

SCORE

1.0 Storage Allocation Requirements (38)

1.1 Are storage requirements allocated to design?

☐ Y ☐ N

Yes = 1, No = 0

☐

2.0 Use of Virtual Storage (39)

2.1 Are virtual storage facilities used?

☐ Y ☐ N

Yes = 1, No = 0

☐

II. METRIC WORKSECTION:

Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the data elements above?
 (1-10) _____ (Ø If you are unable to evaluate)

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

DATA USAGE MEASURE

Form Code: EfPDM.2

LIFE CYCLE PHASE:

PRELIMINARY DESIGN

SOURCE(S):

☐

SYSTEM

NAME: _____

☐

SUBSYSTEM

☐

MODULE

I. DATA COLLECTION WORKSECTION:

SCORE

1.0 Data Efficiency (43)

1.1 On this level, have the data
base or the files been organized
for efficient processing?

☐ Y ☐ N

Yes = 1, No = 0

☐

II. METRIC WORKSECTION:

Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the
reviewed products based on the data elements above?
(1-10) _____ (Ø If you are unable to evaluate)

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

ITERATIVE PROCESSING MEASURE

Form Code: EFPDM.3

LIFE CYCLE PHASE:

PRELIMINARY DESIGN

SOURCE(S):

☐ SYSTEM

NAME: _____

☐ SUBSYSTEM

☐ MODULE

I. DATA COLLECTION WORKSECTION:

1.0 Data Packing (44)

1.1 On this level, is data packing used?

☐ Y ☐ N

Yes = 1, No = 0

SCORE

II. METRIC WORKSECTION:

Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the data elements above?
(1-10) _____ (Ø If you are unable to evaluate)

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

STORAGE EFFICIENCY

Form Code: EfPDC.1

LIFE CYCLE PHASE:

PRELIMINARY DESIGN

SOURCE(S):

EFPDM.1

☐ SYSTEM

NAME: _____

☐ SUBSYSTEM

☐ MODULE

I. METRIC SUMMARY WORKSECTION:

1. Storage Efficiency Measure

SCORE

☐

II. CRITERIA WORKSECTION:

Criteria Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Metrics}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the metrics above?
(1-10) _____ (Ø If you are unable to evaluate)

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

EXECUTION EFFICIENCY

Form Code: EFPDC.2

LIFE CYCLE PHASE:

PRELIMINARY DESIGN

SOURCE(S):

EFPDM.2

EFPDM.3

☐

SYSTEM

NAME: _____

☐

SUBSYSTEM

☐

MODULE

I. METRIC SUMMARY WORKSECTION:

1. Iterative Processing Measure

2. Data Usage Measure

SCORE

☐☐

II. CRITERIA WORKSECTION:

Criteria Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Metrics}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the metrics above?
(1-10) _____ (Ø If you are unable to evaluate)

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

<u>EFFICIENCY</u>			
			Form Code: <u>EfPDF.1</u>
LIFE CYCLE PHASE: PRELIMINARY DESIGN		SOURCE(S): <u>EfPDC.1</u> <u>EfPDC.2</u>	
☐ SYSTEM ☐ SUBSYSTEM ☐ MODULE	NAME: _____ _____ _____		
I. <u>CRITERIA SUMMARY WORKSECTION:</u> 1. Storage Efficiency 2. Execution Efficiency			SCORE
II. <u>FACTOR WORKSECTION:</u> Factor Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Criteria}}$			
III. <u>EVALUATION WORKSECTION:</u> What is your evaluation of the reviewed products based on the criteria above? (1-10)_____ (Ø If you are unable to evaluate)			

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

EFFICIENCY

Complete this score chart if application of this set of worksheets is appropriate when products of B3, and C in analysis phase are available.

Data Element Number	Answer of Data Element	Data Element Score	Metric Score	Criteria Score	Factor Score
<u>38</u>					
<u>39</u>					
<u>43</u>					
<u>44</u>					

FIRST MEASUREMENT

Date _____

Complete this score chart if application of this set of Worksheets is appropriate for update when products of C1 and C2 in Design Phase are available.

Data Element Number	Answer of Data Element	Data Element Score	Metric Score	Criteria Score	Factor Score
<u>38</u>					
<u>39</u>					
<u>43</u>					
<u>44</u>					

SECOND MEASUREMENT

Date _____

EFFICIENCY

Complete this score chart if a third application of this set of worksheets is appropriate for update when products of A1, A2, and B-D1 in Test and Integration Phase are available.

Data Element Number	Answer of Data Element	Data Element Score	Metric Score	Criteria Score	Factor Score
<u>38</u>					
<u>39</u>					
<u>43</u>					
<u>44</u>					

THIRD MEASUREMENT

Date _____

Complete this score chart if a Fourth application of this set of worksheets is appropriate for update when products of A1, A2 and B-D1 in Test and Integration phase are available:

Data Element Number	Answer of Data Element	Data Element Score	Metric Score	Criteria Score	Factor Score
<u>38</u>					
<u>39</u>					
<u>43</u>					
<u>44</u>					

FOURTH MEASUREMENT

Date _____

DATA USAGE MEASURE

Form Code: EfDDM.1

LIFE CYCLE PHASE:

DETAIL DESIGN

SOURCE(S):

☐ SYSTEM

NAME: _____

☐ SUBSYSTEM

☐ MODULE

I. DATA COLLECTION WORKSECTION:

SCORE

1.0 Data Efficiency (43)

1.1 On this level, is the data indexed or referenced efficiently?

☐ Y ☐ N

Yes = 1, No = 0

☐

II. METRIC WORKSECTION:

Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the data elements above?
(1-10) _____ (Ø If you are unable to evaluate)

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

PERFORMANCE REQUIREMENTS CHECKLIST

Form Code: EfDDM.2

LIFE CYCLE PHASE:

DETAIL DESIGN

SOURCE(S):

☐ SYSTEM

NAME: _____

☐ SUBSYSTEM

☐ MODULE

I. DATA COLLECTION WORKSECTION:

SCORE

1.0 Performance Requirements (26)

1.1 Are specific performance requirements allocated to this module in the Design Phase?

☐ Y ☐ N

Yes = 1, No = 2

☐

II. METRIC WORKSECTION:

Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$

☐

**III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the data elements above?
(1-10) _____ (§ If you are unable to evaluate)**

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

ITERATIVE PROCESSING MEASURE

Form Code: EFDDM.3

LIFE CYCLE PHASE:

DETAIL DESIGN

SOURCE(S):

- ☐ SYSTEM
☐ SUBSYSTEM
☐ MODULE

NAME: _____

I. DATA COLLECTION WORKSECTION:

SCORE

1.0 Non-Loop Dependent Computations Kept Out of Loop (100)

1.1 How many non-loop functions are kept out of loops?

1.2 Total number of loop statements.

Score = 1.1 ÷ 1.2

2.0 Data Packing (44)

2.1 On this level, is bit/byte packing/unpacking kept out of loops? Y/N

II. METRIC WORKSECTION:

Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the data elements above? (1-10) _____ (# If you are unable to evaluate)

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

EXECUTION EFFICIENCY

Form Code: EfDDC.1

LIFE CYCLE PHASE:

DETAIL DESIGN

SOURCE(S):

EfDDM.2

EfDDM.3

☐

SYSTEM

NAME: _____

☐

SUBSYSTEM

☐

MODULE

EfDDM.1

I. METRIC SUMMARY WORKSECTION:

1. Data Usage Measure
2. Performance Requirement Checklist
3. Iterative Processing Measure

SCORE

☐
☐
☐

II. CRITERIA WORKSECTION:

Criteria Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Metrics}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the metrics above?
(1-10) _____ (§ If you are unable to evaluate)

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

EFFICIENCY

Form Code: EfDDE.1

LIFE CYCLE PHASE:

DETAIL DESIGN

SOURCE(S):

EfDDC.1

☐

SYSTEM

NAME: _____

☐

SUBSYSTEM

☐

MODULE

I. CRITERIA SUMMARY WORKSECTION:

1. Execution Efficiency

SCORE

☐

II. FACTOR WORKSECTION:

Factor Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Criteria}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the criteria above?
(1-10) _____ (§ If you are unable to evaluate)

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

EFFICIENCY

Complete this score chart if application of this set of worksheets is appropriate when products of A1, A2, A3, A4, B and D in Design Phase are available:

Data Element Number	Answer of Data Element	Data Element Score	Metric Score	Criteria Score	Factor Score
<u>43</u>					
<u>26</u>					
<u>100</u>					
<u>44</u>					

FIRST MEASUREMENT Date _____

Complete this score chart if application of this set of worksheets is appropriate when products of C in Coding and Checkout phase is available.

Data Element Number	Answer of Data Element	Data Element Score	Metric Score	Criteria Score	Factor Score
<u>43</u>					
<u>26</u>					
<u>100</u>					
<u>44</u>					

SECOND MEASUREMENT Date _____

Complete this score chart if application of this set of worksheets is appropriate when products of B-D3, B-D4 in Test and Integration Phase are available.

Data Element Number	Answer of Data Element	Data Element Score	Metric Score	Criteria Score	Factor Score
<u>43</u>					
<u>26</u>					
<u>100</u>					
<u>44</u>					

THIRD MEASUREMENT Date _____

STORAGE EFFICIENCY MEASURE

Form Code: EfIMM.1

LIFE CYCLE PHASE:

IMPLEMENTATION

SOURCE(S):

- ☐ SYSTEM
☐ SUBSYSTEM
☐ MODULE

NAME: _____

I. DATA COLLECTION WORKSECTION:

SCORE

1.0 Program Segmentation (135)

1.1 What is the actual segment length?

1.2 What is the maximum length?

Score = 1.1 ÷ 1.2

2.0 Data Packing in Storage (146)

2.1 Does storage have bit/byte packing/
 unpacking? Y N

If Yes = 1, No = 0

II. METRIC WORKSECTION:

Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$

**III. EVALUATION WORKSECTION: What is your evaluation of the
 reviewed products based on the data elements above?
 (1-10) _____ (# If you are unable to evaluate)**

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

ITERATIVE PROCESSING MEASURE

Form Code: EfIMM.2

LIFE CYCLE PHASE:

IMPLEMENTATION

SOURCE(S):

☐ SYSTEM

NAME: _____

☐ SUBSYSTEM

☐ MODULE

I. DATA COLLECTION WORKSECTION:

SCORE

1.0 Compound Expressions (145)

1.1 Number of compound expressions defined
more than once? ☐

1.2 Number of total compound expressions? ☐

Score = $1 - (\boxed{1.1} \div \boxed{1.2})$

II. METRIC WORKSECTION:

Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$

III. EVALUATION WORKSECTION: What is your evaluation of the
reviewed products based on the data elements above?
(1-10) _____ (Ø If you are unable to evaluate)

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

DATA USAGE MEASURE

Form Code: EfIMM.3

LIFE CYCLE PHASE:

IMPLEMENTATION

SOURCE(S):

☐

SYSTEM

NAME: _____

☐

SUBSYSTEM

☐

MODULE

I. DATA COLLECTION WORKSECTION:

SCORE

1.0 Date Grouped for Efficient Processing (136)

1.1 Have data base or files been
organized for efficient processing?

☐ Y ☐ N

Yes = 1, No = 0

☐

II. METRIC WORKSECTION:

Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the
reviewed products based on the data elements above?
(1-10) _____ (Ø If you are unable to evaluate)

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

STORAGE EFFICIENCY

Form Code: EfIMC.1

LIFE CYCLE PHASE:

IMPLEMENTATION

SOURCE(S):

EfIMM.1

☐

SYSTEM

NAME: _____

☐

SUBSYSTEM

☐

MODULE

I. METRIC SUMMARY WORKSECTION:

1. Storage Efficiency Measure

SCORE

☐

II. CRITERIA WORKSECTION:

Criteria Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Metrics.}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the criteria above?
(1-10) _____ (§ If you are unable to evaluate)

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

EXECUTION EFFICIENCY

Form Code: EfIMC.2

LIFE CYCLE PHASE:
IMPLEMENTATION

SOURCE(S):
EfIMM.2 EfIMM.3

- ☐ SYSTEM
☐ SUBSYSTEM
☐ MODULE

NAME: _____

I. METRIC SUMMARY WORKSECTION:

1. Iterative Processing Measure
2. Data Usage Measure

SCORE

☐
☐

II. CRITERIA WORKSECTION:

Criteria Value $\frac{\text{Sum of Above Scores}}{\text{No. of Metrics}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the metrics above?
(1-10) _____ (Ø If you are unable to evaluate)

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

<u>EFFICIENCY</u>		
		Form Code: <u>EfIMF.1</u>
LIFE CYCLE PHASE: IMPLEMENTATION		SOURCE(S): EfIMC.1 EfIMC.2
☐ SYSTEM ☐ SUBSYSTEM ☐ MODULE	NAME: _____ _____ _____	_____ _____
I. <u>CRITERIA SUMMARY WORKSECTION:</u> 1. Storage Efficiency 2. Execution Efficiency		<u>SCORE</u> ☐ ☐
II. <u>FACTOR WORKSECTION:</u> Factor Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Criteria}}$		☐
III. <u>EVALUATION WORKSECTION:</u> What is your evaluation of the reviewed products based on the criteria above? (1-10) _____ (§ If you are unable to evaluate)		

PREPARED BY: _____ APPROVED BY: _____
 DATE: _____ DATE: _____

EFFICIENCY

Complete this score chart if application of this set of worksheets is appropriate when products of A and B in Coding and Checkout Phase are available.

Data Element Number	Answer of Data Element	Data Element Score	Metric Score	Criteria Score	Factor Score
<u>135</u>					
<u>146</u>					
<u>145</u>					
<u>136</u>					

FIRST MEASUREMENT

Date

Complete this score chart if application of this set of worksheets is appropriate when products of B-D2 in Test and Integration Phase is available.

Data Element Number	Answer of Data Element	Data Element Score	Metric Score	Criteria Score	Factor Score
<u>135</u>					
<u>146</u>					
<u>145</u>					
<u>136</u>					

SECOND MEASUREMENT

Date

Complete this score chart if application of this set of worksheets is appropriate when products of B-D2 in Test and Integration Phase is available.

Data Element Number	Answer of Data Element	Data Element Score	Metric Score	Criteria Score	Factor Score
<u>135</u>					
<u>146</u>					
<u>145</u>					
<u>136</u>					

THIRD MEASUREMENT

Date

QUALITY FACTOR

MODULE NO. 4

INTEGRITY

TABLE OF CONTENTS

<u>TITLE</u>	<u>PAGE</u>
<u>INTRODUCTION AND INSTRUCTIONS FOR INTEGRITY MODULE</u>	
INTRODUCTION TO INTEGRITY.	It-1
STEPS FOR COMPLETING WORKSHEETS	It-4
STEPS FOR UPDATE APPLICATIONS :	It-7
HOW TO USE SCORE CHART SETS	It-8
ESD PRODUCTS FOR ANALYSIS PHASE	It-11
ESD PRODUCTS FOR DESIGN PHASE	It-12
ESD PRODUCTS FOR CODING AND CHECKING PHASE. .	It-13
ESD PRODUCTS FOR TEST AND INTEGRATION PHASE .	It-14
 <u>QUALITY FACTOR NO. 4 INTEGRITY WORKSHEETS</u>	
WORKSHEETS FOR REQUIREMENTS ANALYSIS PHASE. .	It-15
WORKSHEETS FOR PRELIMINARY DESIGN PHASE . . .	It-21

This QUALITY FACTOR MODULE is one of a set of eleven modules that are components of the "COMPUTER SYSTEMS ACQUISITION METRICS HANDBOOK".

INTRODUCTION AND INSTRUCTIONS
FOR
INTEGRITY MODULE

INTRODUCTION TO INTEGRITY

The Quality Factor Integrity represents a measure of the extent to which access to software or data by unauthorized persons can be controlled. FIGURES It - 1 through It - 4 represent the hierarchy of Metric, Criteria and Quality Factor worksheets associated with Integrity in Requirements Analysis, Preliminary Design, Detailed Design and Implementation phases of the Software Development Life Cycle.

The worksheets in this module are grouped into four separate sets, one set for each Life Cycle phase. Each set consists of Metric worksheets, Criteria worksheets, a Factor worksheet and score charts.

METRIC WORKSHEETS

One or more DATA COLLECTION WORKSECTIONS which contain the data element scores for each Metric, and each Metric's Final Score.

CRITERIA WORKSHEETS

One or more METRIC SUMMARY WORKSECTIONS which contain the Metrics scores for each Criteria, and each Criteria's Final Score.

FACTOR WORKSHEETS

One CRITERIA SUMMARY WORKSECTION which contains each Criteria's score, and the Final Score for the Factor for that phase.

SCORE CHARTS:

One or more charts that record worksheet values throughout the Life Cycle.

However, the sequence in which the worksheet sets are applied is dependent on the availability of ESD Computer Program Life Cycle products. Usually the worksheets will be applied sequentially, except for updates.

These instructions show when the Integrity worksheet sets and Score Charts are applied during the Computer Program Life Cycle. The Product Code referred to on the Score Charts is the code defined in the ESD Guidebook Series, Software Acquisition Management Guidebook, Life Cycle Events and reillustrated in the General Instructions. The Product Tables map the ESD Computer Program Life Cycle Products to the Metric Worksheets. The balance of these instructions are step-by-step procedures for completing the worksheets and score chart summaries.

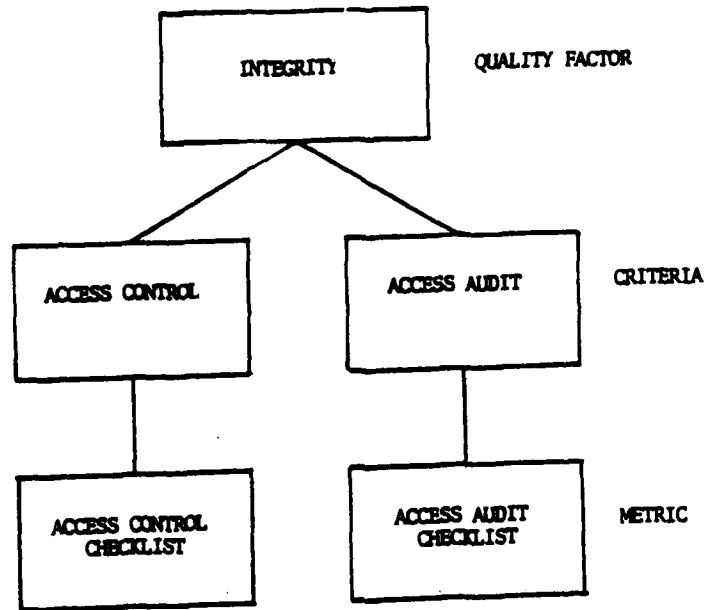


FIGURE It-1
REQUIREMENTS ANALYSIS WORKSHEET HIERARCHY

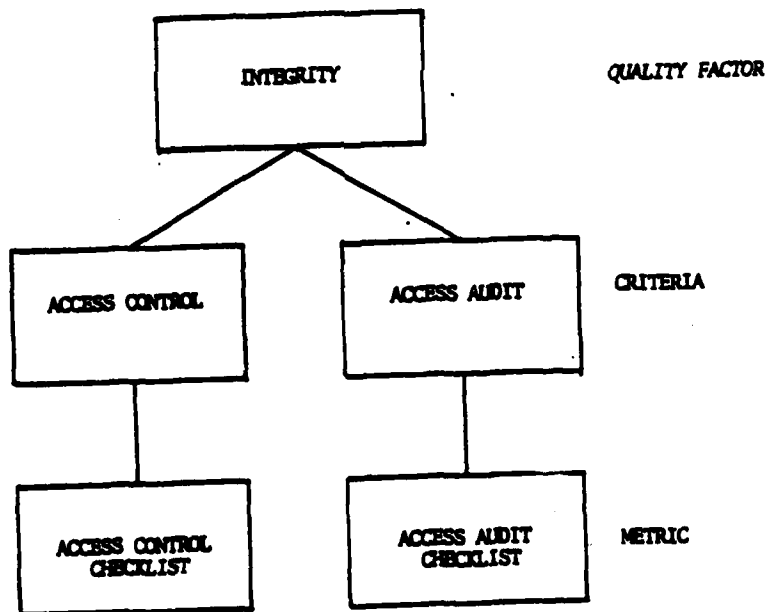


FIGURE It-2
PRELIMINARY DESIGN WORKSHEET HIERARCHY

STEPS FOR COMPLETING WORKSHEETS

Step 1

Enter the appropriate information in the following blocks:

- (1.1) SYSTEM/SUBSYSTEM/MODULE block-Indicate the level of application.
- (1.2) NAME block-List the name of the system being measured.
- (1.3) SOURCE block-On Metric Worksheets, list the source document.
- (1.4) The PREPARED BY and DATE blocks should contain the name of the person performing the software metrics, and the current date.

Step 2

Determine the current Computer Program Life Cycle Phase. This module is concerned with four phases of the Computer Program Life Cycle:

- (2.1) Requirements Analysis
- (2.2) Preliminary Design
- (2.3) Detail Design
- (2.4) Implementation

Step 3

Determine the available products from the phase and which data worksheet set to apply. Each Life Cycle phase has at least three different activities associated with it. The result of the completion of an activity is one or more documents called products.

Before a worksheet set can be applied, specific products associated with it must be obtained. The Product Tables, at the end of the instructions, detail the products required for each worksheet set.

Step 4 - METRIC WORKSHEETS

- (4.1) Answer each question in the Data Collection Worksection as it applies to the system/subsystem/module you are measuring and transfer its scored value to its corresponding SCORE block.

If the question calls for a YES/NO type response, a YES answer is scored at a 1.
a NO answer is scored as a 0.

The questions that call for a numeric quantity type response have specific instructions on how to score the response. Follow the instructions under each data element.

- (4.2) Find the Metric Value by following the algorithm on the worksheet.
- (4.3) Answer the Evaluation Worksection - evaluate the products based on the data elements as they apply to the system.
- (4.4) When you have repeated this procedure for all the Metric Worksheets in the set, you are ready to use the Criteria Worksheets.

Step 5 - CRITERIA WORKSHEETS

- (5.1) Each numbered item in the Metric Summary Worksection represents an individual Metric Value.

- (5.2) Find the Form Code in the SOURCE box of the Criteria Worksheet.
- (5.3) Find the Metric Worksheet with the same Form Code and transfer its Metric Value into the box to the right of the item in the Criteria Worksheet.
- (5.4) Repeat this process for all items in the Metric Summary Worksection.
- (5.5) Find the Criteria Value by following the algorithm on the worksheet.
- (5.6) Answer the Evaluation Worksection - evaluate the products based on the Metrics as they apply to the system.

Step 6 - FACTOR WORKSHEETS

- (6.1) Each numbered item in the Criteria Summary Worksection represents an individual Criterion Value.
- (6.2) Find the Form Code in the SOURCE box of the Factor Worksheet.
- (6.3) Find the Criteria Worksheet with the same Form Code and transfer its Criteria Value into the box in the Score column in the Factor Worksheet.
- (6.4) Repeat this process for all items in the Criteria Summary Worksection.
- (6.5) Answer the Evaluation Worksection - evaluate the products based on the Criteria as they apply to the system.
- (6.6) Find the Factor Value by following the algorithm on the Worksheet.

STEPS FOR UPDATE APPLICATIONS

Step 1

Determine the update necessary. The Product Tables at the end of these instructions list the updates required and the activities and products associated with each update. Also review Section 2.3.2, "Update Information Requirements", in the General Instructions Handbook for further information if necessary.

Step 2

Obtain the required products. The Products Tables at the end of these Instructions list the products required for each update application.

Step 3

Reapply the Metric, Criteria, and Factor worksheets by following the procedure already outlined in "Steps for Completing Worksheets", of these Instructions. "How to Use Score Chart sets", explains the procedure for reporting the update scores.

HOW TO USE SCORE CHART SETS

When you apply worksheets to system/subsystem/module, you must apply some worksheets more than once in the Computer Program Life Cycle. Because of this, a Score Chart set is organized so that the groups of worksheet scores, acquired at the times a set of worksheets is applied, can be recorded separately: originals & updates.

The Score Chart set (at the end of each worksheet set) is composed of similar tree structure diagrams. Each Score Chart represents the complete hierarchy of scores to be acquired during any one application of worksheets sets in the Life Cycle.

When applying any worksheet, in order to record scores you must locate and use the Score Chart that corresponds to the current phase in the Life Cycle. In a Score Chart set, the first Score Chart (labeled FIRST MEASUREMENT) is designed to receive the scores from the first application of a worksheet set in the Life Cycle, and the following charts (i.e., labeled SECOND MEASUREMENT, etc.) are designed to receive the scores from the updates.

Each data element in the Metrics Worksheet has a unique number in the Data Element Dictionary, which is listed in the first column in the Score Chart. The next two columns of boxes in a Score Chart show a worksheet set's individual data element raw scores and its interpreted response (Yes/No, = 1 or 0, etc.). The last three box columns map out the Metric, Criteria and Factor worksheets of a set, each box representing the total score of a corresponding worksheet.

Once you have finished scoring a Worksheet set and located the corresponding Score Chart set, use the following procedure for filling out the Score Chart:

Step 1 - ANSWER OF DATA ELEMENT/DATA ELEMENT SCORE

For each data element in a Metric Worksheet:

- (1.1) Reference its number in the "Data Element Number" Column in the Score Chart.
- (1.2) Transfer the answers you gave to the questions in the Data Collection Worksection to the corresponding box under the column headed "Answer of Data Element"
- (1.3) Transfer the Scores of the data element from the Data Collection Worksection to its corresponding box under column labeled "Data Element Score".
- (1.4) Repeat this step for all data elements within this phase.

Step 2 - METRIC SCORE

Each box in this column represents the Score from the Metric Worksection of a Metric Worksheet. Transfer the Metric Value from each Metric Worksheet into the corresponding boxes in the Score Chart's Metric Score Column.

Step 3 - CRITERIA SCORE

Each box in this column represents the score from the Criteria Worksection of a Criteria Worksheet into the corresponding boxes of the Score Chart's Criteria Score Column.

Step 4 - FACTOR SCORE

Each box in this column represents the score from the Factor Worksection of a Quality Factor Worksheet. Transfer the Factor from the set's Factor Worksheet into corresponding boxes of the Score Chart's Factor Score Column.

These Score Chart sets will provide a historical base for repeated application of the metrics to a system at all levels. They are also a useful means of reporting your finds to the program manager in a condensed and compact form.

PRODUCTS	TRADE-OFF STUDY REPORTS	INITIAL OR AUTHENTICATED SYSTEM SPEC, SEGMENT SPEC	AUTHENTICATED DEVELOPMENT SPEC FOR CPCI	HIGHER LEVEL SPEC	DRAFT PRODUCT SPECS	PDR MINUTES AND ACTION ITEM RESPONSES
WORKSHEET SET TO BE APPLIED	REQUIREMENTS ANALYSIS WORKSHEETS				PRELIMINARY DESIGN WORKSHEETS	

ESD PRODUCTS FOR ANALYSIS PHASE

Apply the Requirement Analysis Worksheets as the following types of products become available. See note below.

- Product A.1 - Trade-off Study Reports
- Product A.2 - Initial or Authenticated System Specification & Segment Specification (if any)
- Product B.1 - Authenticated Development Specification for each CPCI
- Product B.2 - Possible higher-level specification, ICD and changes

Apply the Preliminary Design Worksheets as the following types of products become available. See note below.

- Product B.3 - Parts of draft Product Specifications containing design approaches for each CPCI
- Product C. - PDR minutes and action item responses

NOTE: If these products do not contain the information requested by the Data Element questions, other contractor-supplied information should be searched.

PRODUCTS	FUNCTIONAL FLOW CHARTS	DE- TAILED FLOW CHART	DATA FORMAT DESC.	ALGO- RITHM DESC.	PRELIMI- NARY PRODUCT DESC.	CDR MINUTES ACTION ITEM RESPON- SES	SYSTEM SEG- MENT TEST PLANS	PRELIM. CPCI TEST PRO- CEDURES
WORKSHEET SET TO BE APPLIED	DETAILED DESIGN WORKSHEETS						PRELIMINARY DESIGN WORKSHEETS, (UPDATE)	

ESD PRODUCTS FOR DESIGN PHASE

Apply the Detailed Design Worksheets as the following types of products become available. See note below.

- Product A.1: Functional flowcharts
- Product A.2: Detailed flowcharts
- Product A.3: Data format descriptions
- Product A.4: Descriptions of algorithms not previously prescribed
- Product B. : Preliminary Product Specifications, including the above
- Product D. : CDR minutes & action item responses

Apply the Preliminary Design Worksheets for Update as the following types of products become available. See note.

- Product C.1: System, Segment and CPCI Test Plans
- Product C.2: Preliminary CPCI Test Procedures

NOTE: If these products do not contain the information requested by the Data Element questions, other contractor-supplied information should be searched.

PRODUCTS	CODE	ALTERED PRODUCT SPECS
WORKSHEET SET TO BE APPLIED	IMPLEMENTATION WORKSHEETS	DETAILED DESIGN WORKSHEETS (UPDATE)

ESD PRODUCTS FOR CODING AND CHECKING PHASE

Apply the Implementation Worksheets as the code becomes available.

Apply the Detailed Design Worksheets for Update as the following types of products become available. See note below.

- Product C. - Altered Product Specifications, including compiler/assembly listings.

NOTE: If these products do not contain the information requested by the Data Element questions, other contractor-supplied information should be searched.

PRODUCTS	FINAL CPCI TEST PROCEDURES	SEGMENT & SYSTEM LEVEL TEST PROCEDURES	TEST REPORTS	CODING CHANGES	MODIFIED PRODUCT SPECS	HIGH LEVEL SPECS
WORKSHEET SET TO BE APPLIED	PRELIMINARY DESIGN WORKSHEETS			IMPLEMEN- TATION WORKSHEETS	DETAILED DESIGN WORKSHEETS (UPDATE)	

ESD PRODUCTS FOR TEST AND
INTEGRATION PHASE

Apply the Preliminary Design Worksheets for Update as the following types of products become available. See note below.

- A Product 1: Final CPCI Test Procedures
- Product 2: Segment (if any) and system-level Test Procedures

- B-D Product 1: Test Reports

Apply the Implementation Worksheets for Update as the following types of products become available. See note below.

- B-D Product 2: Computer Program Coding Changes

Apply the Detailed Design Worksheets for Update as the following types of products become available. See note.

- B-D Product 3: Modified Product Specification
- Product 4: Possible high-level specification, ICD and changes.

NOTE: If these products do not contain the information requested by the Data Element questions, other contractor-supplied information should be searched.

ACCESS CONTROL CHECKLIST

Form Code: ItRAM.1

LIFE CYCLE PHASE:

REQUIREMENTS ANALYSIS

SOURCE(S):

- ☐ SYSTEM
☐ SUBSYSTEM
☐ MODULE

NAME: _____

I. DATA COLLECTION WORKSECTION:

SCORE

1.0 Input/Output Access Control (15)

1.1 Is there a definitive statement of the requirement for user input/output access controls in the Requirements Analysis Phase?

☐ Y ☐ N

Yes = 1, No = 0

☐

2.0 Data Base Access Control (16)

2.1 Is there a definitive statement of the requirement for data base access controls in the Requirements Analysis Phase?

☐ Y ☐ N

Yes = 1, No = 0

☐

3.0 Memory Protection (17)

3.1 Is there a definitive statement of the requirement for memory protection across tasks in the Requirements Analysis Phase?

☐ Y ☐ N

Yes = 1, No = 0

☐

II. METRIC WORKSECTION:

Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the data elements above? (1-10) _____ (§ If you are unable to evaluate)

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

ACCESS AUDIT CHECKLIST

Form Code: ItRAM.2

LIFE CYCLE PHASE: REQUIREMENT ANALYSIS		SOURCE(S): _____ _____
☐ SYSTEM	NAME: _____	
☐ SUBSYSTEM	_____	
☐ MODULE	_____	

I. DATA COLLECTION WORKSECTION:	SCORE
1.0 <u>Recording and Reporting Access</u> (18) 1.1 Are there definitive statements of the requirements for recording and reporting access in the Requirements Analysis Phase? ☐ Y ☐ N Yes = 1, No = 0	☐
2.0 <u>Indication of Access Violation</u> (19) 2.1 Is there a definitive statement of the requirements for immediate indication of access violation in the Requirements Analysis Phase? ☐ Y ☐ N Yes = 1, No = 0	☐

II. <u>METRIC WORKSECTION:</u> Metric Value = $\frac{\text{Sum of Above Score}}{\text{No. of Data Elements}}$	☐

III. <u>EVALUATION WORKSECTION:</u> What is your evaluation of the reviewed products based on the data elements above? (1-10) _____ (§ If you are unable to evaluate)

IV. <u>INSPECTOR'S COMMENTS:</u>

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

ACCESS CONTROL

Form Code: ItRAC.1

LIFE CYCLE PHASE:

REQUIREMENTS ANALYSIS

SOURCE(S):

ItRAM.1

☐ SYSTEM

NAME: _____

☐ SUBSYSTEM

☐ MODULE

I. METRIC SUMMARY WORKSECTION:

1. Access Control Checklist

SCORE

☐

II. CRITERIA WORKSECTION:

Criteria Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Metrics}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the metrics above?
(1-10) _____ (Ø If you are unable to evaluate)

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

ACCESS AUDIT

Form Code: ItRAC.2

LIFE CYCLE PHASE:

REQUIREMENTS ANALYSIS

SOURCE(S):

ItRAM. 2

☐ SYSTEM

NAME: _____

☐ SUBSYSTEM

☐ MODULE

I. METRIC SUMMARY WORKSECTION:

1. Access Audit Checklist

SCORE

☐

II. CRITERIA WORKSECTION:

Criteria Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Metrics}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the metrics above?
(1-10) _____ (§ If you are unable to evaluate)

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

INTEGRITY

Form Code: ItRAF.1

LIFE CYCLE PHASE:

REQUIREMENTS ANALYSIS

SOURCE(S):

ItRAC.1

ItRAC.2

☐

SYSTEM

NAME: _____

☐

SUBSYSTEM

☐

MODULE

I. CRITERIA SUMMARY WORKSECTION:

1. Access Control

2. Access Audit

SCORE

☐☐

VI. FACTOR WORKSECTION:

Factor Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Criteria}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the criteria above?
(1-10) _____ (0 If you are unable to evaluate)

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

INTEGRITY

Complete this score chart if an application of this set of worksheets is appropriate when products of A1, A2, E1 and E2 in Analysis Phase becomes available.

<u>Data Element Number</u>	<u>Answer of Data Element</u>	<u>Data Element Score</u>	<u>Metric Score</u>	<u>Criteria Score</u>	<u>Factor Score</u>
<u>15</u>					
<u>16</u>					
<u>17</u>					
<u>18</u>					
<u>19</u>					

FIRST MEASUREMENT Date

Complete this score chart if a second application of this set of worksheets is appropriate for update when products of A1, A2, B1 and B2 in Analysis phase are available.

<u>Data Element Number</u>	<u>Answer of Data Element</u>	<u>Data Element Score</u>	<u>Metric Score</u>	<u>Criteria Score</u>	<u>Factor Score</u>
<u>15</u>					
<u>16</u>					
<u>17</u>					
<u>18</u>					
<u>19</u>					

SECOND MEASUREMENT Date

ACCESS CONTROL CHECKLIST

Form Code: ItPDM.1

LIFE CYCLE PHASE:

PRELIMINARY DESIGN

SOURCE(S):

- ☐ SYSTEM
☐ SUBSYSTEM
☐ MODULE

NAME: _____

I. DATA COLLECTION WORKSECTION:

SCORE

1.0 Input/Output Access Control (15)

1.1 Are user input/output access controls provided in the Design and Implementation Phases?

☐ Y ☐ N

Yes = 1, No = 0

☐

2.0 Data Base Access Control (16)

2.1 Are data base access controls provided in the Design and Implementation Phases?

☐ Y ☐ N

Yes = 1, No = 0

☐

3.0 Memory Protection (17)

3.1 Is memory protection across tasks provided in the Design and Implementation Phases?

☐ Y ☐ N

Yes = 1, No = 0

☐

II. METRIC WORKSECTION:

Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the data elements above?
 (1-10) _____ (§ If you are unable to evaluate)

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

ACCESS AUDIT CHECKLIST

Form Code: ItPDM.2

LIFE CYCLE PHASE:

PRELIMINARY DESIGN

SOURCE(S):

☐ SYSTEM

NAME: _____

☐ SUBSYSTEM

☐ MODULE

I. DATA COLLECTION WORKSECTION:

SCORE

1.0 Recording and Reporting Access (18)

1.1 Are provisions for recording and reporting access provided in the Design and Implementation Phases?

☐ Y ☐ N

Yes = 1, No = 0

☐

2.0 Indication of Access Violation (19)

2.1 Are provisions for indication of access violation provided in the Design and Implementation Phases?

☐ Y ☐ N

Yes = 1, No = 0

☐

II. METRIC WORKSECTION:

Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the data elements above?
(1-10) _____ (Ø If you are unable to evaluate)

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

ACCESS CONTROL

Form Code: ItPDC.1

LIFE CYCLE PHASE:

PRELIMINARY DESIGN

SOURCE(S):

ItPDM.1

☐ SYSTEM

NAME: _____

☐ SUBSYSTEM

☐ MODULE

I. METRIC SUMMARY WORKSECTION:

1. Access Control Checklist

SCORE

☐

II. CRITERIA WORKSECTION:

Criteria Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Metrics}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the metrics above?
(1-10) _____ (Ø If you are unable to evaluate)

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

ACCESS AUDIT

Form Code: ItPDC.2

LIFE CYCLE PHASE:

PRELIMINARY DESIGN

SOURCE(S):

ItPDM.2

☐ SYSTEM

NAME: _____

☐ SUBSYSTEM

☐ MODULE

I. METRIC SUMMARY WORKSECTION:

1. Access Audit Checklist

SCORE

☐

II. CRITERIA WORKSECTION:

Criteria Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Metrics}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the metrics above?
(1-10) _____ (Ø If you are unable to evaluate)

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

<u>INTEGRITY</u>		
		Form Code: <u>ItPDF.1</u>
LIFE CYCLE PHASE: PRELIMINARY DESIGN	SOURCE(S): <u>ItPDC.1</u> <u>ItPDC.2</u>	
☐ SYSTEM ☐ SUBSYSTEM ☐ MODULE	NAME: _____ _____ _____	_____ _____
I. <u>CRITERIA SUMMARY WORKSECTION:</u> 1. Access Control 2. Access Audit		SCORE
II. <u>FACTOR WORKSECTION:</u> Factor Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Criteria}}$		
III. <u>EVALUATION WORKSECTION:</u> What is your evaluation of the reviewed products based on the criteria above? (1-10) _____ (Ø If you are unable to evaluate)		

PREPARED BY: _____ APPROVED BY: _____
 DATE: _____ DATE: _____

INTEGRITY

Complete this score chart if an application of this set of worksheets is appropriate when products of B3 and C in Analysis Phase become available.

Data Element Number	Answer of Data Element	Data Element Score	Metric Score	Criteria Score	Factor Score
<u>15</u>					
<u>16</u>					
<u>17</u>					
<u>18</u>					
<u>19</u>					

FIRST MEASUREMENT

DATE

Complete this score chart if a second application of this set of worksheets is appropriate for update when products of C1 and C2 in Design phase become available.

Data Element Number	Answer of Data Element	Data Element Score	Metric Score	Criteria Score	Factor Score
<u>15</u>					
<u>16</u>					
<u>17</u>					
<u>18</u>					
<u>19</u>					

SECOND MEASUREMENT

DATE

INTEGRITY

Complete this score chart if a third application of this set of worksheets is appropriate for update when products of A1, A2 and B-D1 in Test and Integration Phase become available.

<u>Data Element Number</u>	<u>Answer of Data Element</u>	<u>Data Element Score</u>	<u>Metric Score</u>	<u>Criteria Score</u>	<u>Factor Score</u>
<u>15</u>					
<u>16</u>					
<u>17</u>					
<u>18</u>					
<u>19</u>					

THIRD MEASUREMENT

Date _____

Complete this score chart if a fourth application of this set of worksheets is appropriate for update when products of A1 and A2 and B-D1 in Test and Integration Phase are available.

<u>Data Element Number</u>	<u>Answer of Data Element</u>	<u>Data Element Score</u>	<u>Metric Score</u>	<u>Criteria Score</u>	<u>Factor Score</u>
<u>15</u>					
<u>16</u>					
<u>17</u>					
<u>18</u>					
<u>19</u>					

FOURTH MEASUREMENT

Date _____

QUALITY FACTOR

MODULE NO. 5

USABILITY

TABLE OF CONTENTS

<u>TITLE</u>	<u>PAGE</u>
<u>INTRODUCTION AND INSTRUCTIONS FOR USABILITY MODULE</u>	
INTRODUCTION TO USABILITY.	Us-1
STEPS FOR COMPLETING WORKSHEETS	Us-4
STEPS FOR UPDATE APPLICATIONS	Us-7
HOW TO USE SCORE CHART SETS	Us-8
ESD PRODUCTS FOR ANALYSIS PHASE	Us-11
ESD PRODUCTS FOR DESIGN PHASE	Us-12
ESD PRODUCTS FOR CODING AND CHECKING PHASE. .	Us-13
ESD PRODUCTS FOR TEST AND INTEGRATION PHASE .	Us-14
 <u>QUALITY FACTOR NO. 5 USABILITY WORKSHEETS</u>	
WORKSHEETS FOR REQUIREMENTS ANALYSIS PHASE. .	Us-15
WORKSHEETS FOR PRELIMINARY DESIGN PHASE . . .	Us-22

This QUALITY FACTOR MODULE is one of a set of eleven modules that are components of the "COMPUTER SYSTEMS ACQUISITION METRICS HANDBOOK".

INTRODUCTION AND INSTRUCTIONS
FOR
USABILITY MODULE

INTRODUCTION TO USABILITY

The Quality Factor Usability represents a measure of the effort required to learn, operate, prepare input, and interpret output of a program. FIGURES Us - 1 through Us - 4 represent the hierarchy of Metric, Criteria and Quality Factor worksheets associated with Usability in Requirements Analysis, Preliminary Design, Detailed Design and Implementation phases of the Software Development Life Cycle.

The worksheets in this module are grouped into four separate sets, one set for each Life Cycle phase. Each set consists of Metric worksheets, Criteria worksheets, a Factor worksheet and score charts.

METRIC WORKSHEETS

One or more DATA COLLECTION WORKSECTIONS which contain the data element scores for each Metric, and each Metric's Final Score.

CRITERIA WORKSHEETS

One or more METRIC SUMMARY WORKSECTIONS which contain the Metrics scores for each Criteria, and each Criteria's Final Score.

FACTOR WORKSHEETS

One CRITERIA SUMMARY WORKSECTION which contains each Criteria's score, and the Final Score for the Factor for that phase.

SCORE CHARTS:

One or more charts that record worksheet values throughout the Life Cycle.

However, the sequence in which the worksheet sets are applied is dependent on the availability of ESD Computer Program Life Cycle products. Usually the worksheets will be applied sequentially, except for updates.

These instructions show when the Usability worksheet sets and Score Charts are applied during the Computer Program Life Cycle. The Product Code referred to on the Score Charts is the code defined in the ESD Guidebook Series, Software Acquisition Management Guidebook, Life Cycle Events and reillustrated in the General Instructions. The Product Tables map the ESD Computer Program Life Cycle Products to the Metric Worksheets. The balance of these instructions are step-by-step procedures for completing the worksheets and score chart summaries.

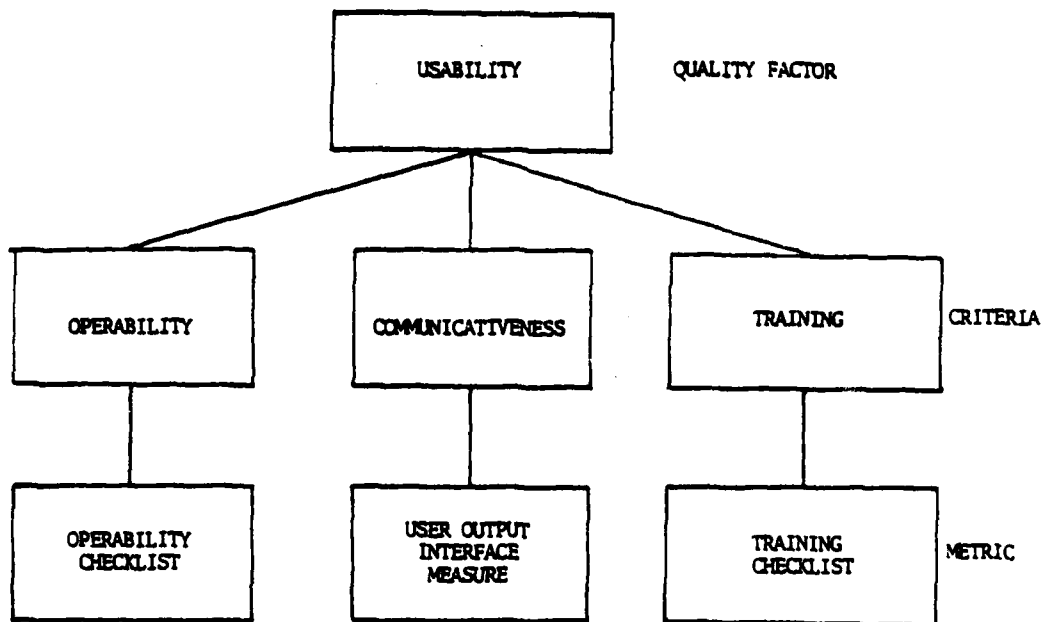


FIGURE Us-1
REQUIREMENTS ANALYSIS WORKSHEET HIERARCHY

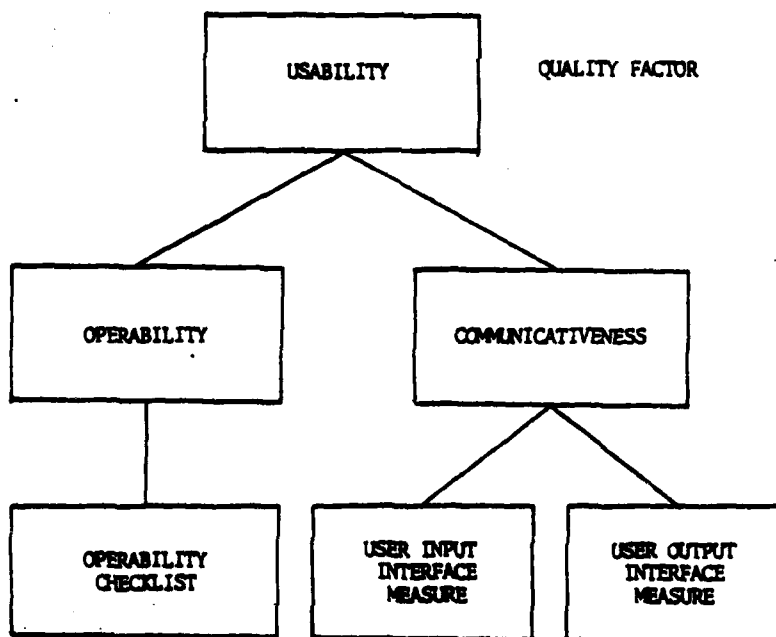


FIGURE Us-2
PRELIMINARY DESIGN WORKSHEET HIERARCHY

STEPS FOR COMPLETING WORKSHEETS

Step 1

Enter the appropriate information in the following blocks:

- (1.1) SYSTEM/SUBSYSTEM/MODULE block-Indicate the level of application.
- (1.2) NAME block-List the name of the system being measured.
- (1.3) SOURCE block-On Metric Worksheets, list the source document.
- (1.4) The PREPARED BY and DATE blocks should contain the name of the person performing the software metrics, and the current date.

Step 2

Determine the current Computer Program Life Cycle Phase. This module is concerned with four phases of the Computer Program Life Cycle:

- (2.1) Requirements Analysis
- (2.2) Preliminary Design
- (2.3) Detail Design
- (2.4) Implementation

Step 3

Determine the available products from the phase and which data worksheet set to apply. Each Life Cycle phase has at least three different activities associated with it. The result of the completion of an activity is one or more documents called products.

Before a worksheet set can be applied, specific products associated with it must be obtained. The Product Tables, at the end of the instructions, detail the products required for each worksheet set.

Step 4 - METRIC WORKSHEETS

- (4.1) Answer each question in the Data Collection Worksection as it applies to the system/subsystem/module you are measuring and transfer its scored value to its corresponding SCORE block.

If the question calls for a YES/NO type response, a YES answer is scored at a 1.
a NO answer is scored as a 0.

The questions that call for a numeric quantity type response have specific instructions on how to score the response. Follow the instructions under each data element.

- (4.2) Find the Metric Value by following the algorithm on the worksheet.
- (4.3) Answer the Evaluation Worksection - evaluate the products based on the data elements as they apply to the system.
- (4.4) When you have repeated this procedure for all the Metric Worksheets in the set, you are ready to use the Criteria Worksheets.

Step 5 - CRITERIA WORKSHEETS

- (5.1) Each numbered item in the Metric Summary Worksection represents an individual Metric Value.

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COMPUTER SYSTEMS ACQUISITION METRICS HANDBOOK, VOLUME II. QUALI--ETC(U)

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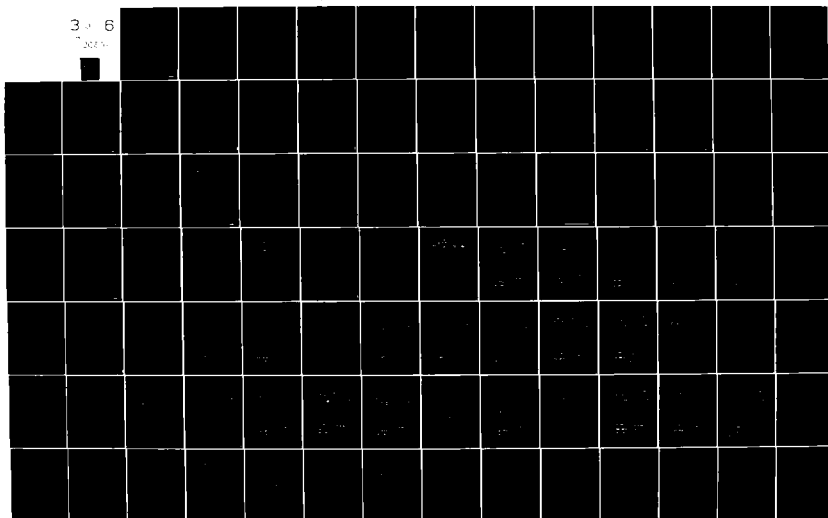
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3 of 6

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- (5.2) Find the Form Code in the SOURCE box of the Criteria Worksheet.
- (5.3) Find the Metric Worksheet with the same Form Code and transfer its Metric Value into the box to the right of the item in the Criteria Worksheet.
- (5.4) Repeat this process for all items in the Metric Summary Worksection.
- (5.5) Find the Criteria Value by following the algorithm on the worksheet.
- (5.6) Answer the Evaluation Worksection - evaluate the products based on the Metrics as they apply to the system.

Step 6 - FACTOR WORKSHEETS

- (6.1) Each numbered item in the Criteria Summary Worksection represents an individual Criterion Value.
- (6.2) Find the Form Code in the SOURCE box of the Factor Worksheet.
- (6.3) Find the Criteria Worksheet with the same Form Code and transfer its Criteria Value into the box in the Score column in the Factor Worksheet.
- (6.4) Repeat this process for all items in the Criteria Summary Worksection.
- (6.5) Answer the Evaluation Worksection - evaluate the products based on the Criteria as they apply to the system.
- (6.6) Find the Factor Value by following the algorithm on the Worksheet.

STEPS FOR UPDATE APPLICATIONS

Step 1

Determine the update necessary. The Product Tables at the end of these instructions list the updates required and the activities and products associated with each update. Also review Section 2.3.2, "Update Information Requirements", in the General Instructions Handbook for further information if necessary.

Step 2

Obtain the required products. The Products Tables at the end of these Instructions list the products required for each update application.

Step 3

Reapply the Metric, Criteria, and Factor worksheets by following the procedure already outlined in "Steps for Completing Worksheets", of these Instructions. "How to Use Score Chart sets", explains the procedure for reporting the update scores.

HOW TO USE SCORE CHART SETS

When you apply worksheets to system/subsystem/module, you must apply some worksheets more than once in the Computer Program Life Cycle. Because of this, a Score Chart set is organized so that the groups of worksheet scores, acquired at the times a set of worksheets is applied, can be recorded separately: originals & updates.

The Score Chart set (at the end of each worksheet set) is composed of similar tree structure diagrams. Each Score Chart represents the complete hierarchy of scores to be acquired during any one application of worksheets sets in the Life Cycle.

When applying any worksheet, in order to record scores you must locate and use the Score Chart that corresponds to the current phase in the Life Cycle. In a Score Chart set, the first Score Chart (labeled FIRST MEASUREMENT) is designed to receive the scores from the first application of a worksheet set in the Life Cycle, and the following charts (i.e., labeled SECOND MEASUREMENT, etc.) are designed to receive the scores from the updates.

Each data element in the Metrics Worksheet has a unique number in the Data Element Dictionary, which is listed in the first column in the Score Chart. The next two columns of boxes in a Score Chart show a worksheet set's individual data element raw scores and its interpreted response (Yes/No, = 1 or 0, etc.). The last three box columns map out the Metric, Criteria and Factor worksheets of a set, each box representing the total score of a corresponding worksheet.

Once you have finished scoring a Worksheet set and located the corresponding Score Chart set, use the following procedure for filling out the Score Chart:

Step 1 - ANSWER OF DATA ELEMENT/DATA ELEMENT SCORE

For each data element in a Metric Worksheet:

- (1.1) Reference its number in the "Data Element Number" Column in the Score Chart.
- (1.2) Transfer the answers you gave to the questions in the Data Collection Worksection to the corresponding box under the column headed "Answer of Data Element"
- (1.3) Transfer the Scores of the data element from the Data Collection Worksection to its corresponding box under column labeled "Data Element Score".
- (1.4) Repeat this step for all data elements within this phase.

Step 2 - METRIC SCORE

Each box in this column represents the Score from the Metric Worksection of a Metric Worksheet. Transfer the Metric Value from each Metric Worksheet into the corresponding boxes in the Score Chart's Metric Score Column.

Step 3 - CRITERIA SCORE

Each box in this column represents the score from the Criteria Worksection of a Criteria Worksheet into the corresponding boxes of the Score Chart's Criteria Score Column.

Step 4 - FACTOR SCORE

Each box in this column represents the score from the Factor Worksection of a Quality Factor Worksheet. Transfer the Factor from the set's Factor Worksheet into corresponding boxes of the Score Chart's Factor Score Column.

These Score Chart sets will provide a historical base for repeated application of the metrics to a system at all levels. They are also a useful means of reporting your finds to the program manager in a condensed and compact form.

PRODUCTS	TRADE-OFF STUDY REPORTS	INITIAL OR AUTHENTICATED SYSTEM SPEC, SEGMENT SPEC	AUTHENTICATED DEVELOPMENT SPEC FOR CPCI	HIGHER LEVEL SPEC	DRAFT PRODUCT SPECS	PDR MINUTES AND ACTION ITEM RESPONSES
WORKSHEET SET TO BE APPLIED	REQUIREMENTS ANALYSIS WORKSHEETS				PRELIMINARY DESIGN WORKSHEETS	

ESD PRODUCTS FOR ANALYSIS PHASE

Apply the Requirement Analysis Worksheets as the following types of products become available. See note below.

- Product A.1 - Trade-off Study Reports
- Product A.2 - Initial or Authenticated System Specification & Segment Specification (if any)
- Product B.1 - Authenticated Development Specification for each CPCI
- Product B.2 - Possible higher-level specification, ICD and changes

Apply the Preliminary Design Worksheets as the following types of products become available. See note below.

- Product B.3 - Parts of draft Product Specifications containing design approaches for each CPCI
- Product C. - PDR minutes and action item responses

NOTE: If these products do not contain the information requested by the Data Element questions, other contractor-supplied information should be searched.

PRODUCTS	FUNCTIONAL FLOW CHARTS	DE- TAILED FLOW CHART	DATA FORMAT DESC.	ALGO- RITHM DESC.	PRELIMI- NARY PRODUCT DESC.	CDR MINUTES ACTION ITEM RESPON- SES	SYSTEM SEG- MENT TEST PLANS	PRELIM. CPCI TEST PRO- CEDURES
WORKSHEET SET TO BE APPLIED	DETAILED DESIGN WORKSHEETS						PRELIMINARY DESIGN WORKSHEETS, (UPDATE)	

ESD PRODUCTS FOR DESIGN PHASE

Apply the Detailed Design Worksheets as the following types of products become available. See note below.

- Product A.1: Functional flowcharts
- Product A.2: Detailed flowcharts
- Product A.3: Data format descriptions
- Product A.4: Descriptions of algorithms not previously prescribed
- Product B. : Preliminary Product Specifications, including the above
- Product D. : CDR minutes & action item responses

Apply the Preliminary Design Worksheets for Update as the following types of products become available. See note.

- Product C.1: System, Segment and CPCI Test Plans
- Product C.2: Preliminary CPCI Test Procedures

NOTE: If these products do not contain the information requested by the Data Element questions, other contractor-supplied information should be searched.

PRODUCTS	CODE	ALTERED PRODUCT SPECS
WORKSHEET SET TO BE APPLIED	IMPLEMENTATION WORKSHEETS	DETAILED DESIGN WORKSHEETS (UPDATE)

ESD PRODUCTS FOR CODING AND CHECKING PHASE

Apply the Implementation Worksheets as the code becomes available.

Apply the Detailed Design Worksheets for Update as the following types of products become available. See note below.

- Product C. - Altered Product Specifications, including compiler/assembly listings.

NOTE: If these products do not contain the information requested by the Data Element questions, other contractor-supplied information should be searched.

PRODUCTS	FINAL CPCI TEST PROCEDURES	SEGMENT & SYSTEM LEVEL TEST PROCEDURES	TEST REPORTS	CODING CHANGES	MODIFIED PRODUCT SPECS	HIGH LEVEL SPECS
WORKSHEET SET TO BE APPLIED	PRELIMINARY DESIGN WORKSHEETS			IMPLEMEN- TATION WORKSHEETS	DETAILED DESIGN WORKSHEETS (UPDATE)	

ESD PRODUCTS FOR TEST AND
INTEGRATION PHASE

Apply the Preliminary Design Worksheets for Update as the following types of products become available. See note below.

- A Product 1: Final CPCI Test Procedures
- Product 2: Segment (if any) and system-level Test Procedures

- B-D Product 1: Test Reports

Apply the Implementation Worksheets for Update as the following types of products become available. See note below.

- B-D Product 2: Computer Program Coding Changes

Apply the Detailed Design Worksheets for Update as the following types of products become available. See note.

- B-D Product 3: Modified Product Specification
- Product 4: Possible high-level specification, ICD and changes.

NOTE: If these products do not contain the information requested by the Data Element questions, other contractor-supplied information should be searched.

OPERABILITY CHECKLIST

Form Code: UsRAM.1

LIFE CYCLE PHASE:		SOURCE(S):	
REQUIREMENTS ANALYSIS			
☐ SYSTEM	NAME: _____		
☐ SUBSYSTEM	_____		
☐ MODULE	_____		

I. <u>DATA COLLECTION WORKSECTION:</u>	SCORE
1.0 <u>Operating Characteristics</u> (20)	
1.1 Are all steps in the operation described? Y N Yes = 1, No = 0	☐
2.0 <u>Error Conditions and Responses</u> (21)	
2.1 Are all error conditions to be reported to the operator/user identified, and are the responses described? Y N Yes = 1, No = 0	☐
3.0 <u>Operator's Capabilities</u> (22)	
3.1 Is there a definitive statement of the requirements for the capability to interrupt operation, obtain status, modify, and continue processing in the Requirements Analysis Phase? Y N Yes = 1, No = 0	☐
II. <u>METRIC WORKSECTION:</u> Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$	☐
III. <u>EVALUATION WORKSECTION:</u> What is your evaluation of the reviewed products based on the data elements above? (1-10) _____ (Ø If you are unable to evaluate)	
IV. <u>INSPECTOR'S COMMENTS:</u>	

PREPARED BY: _____ APPROVED BY: _____
 DATE: _____ DATE: _____

USER OUTPUT INTERFACE MEASURE

Form Code: UsRAM.2

LIFE CYCLE PHASE:

REQUIREMENTS ANALYSIS

SOURCE(S):

☐ SYSTEM

NAME: _____

☐ SUBSYSTEM

☐ MODULE

I. DATA COLLECTION WORKSECTION:

SCORE

1.0 Flexibility of Output (24)

1.1 Is there a definitive statement of the requirement for optional output media in the Requirements Analysis Phase?

☐ Y ☐ N

Yes = 1, No = 0

2.0 Output Control (25)

2.1 Is there a definitive statement of the requirements for selective output control in the Requirements Analysis Phase?

☐ Y ☐ N

Yes = 1, No = 0

II. METRIC WORKSECTION:

Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the data elements above? (1-10) _____ (Ø If you are unable to evaluate)

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

<u>USER INPUT INTERFACE MEASURE</u>		
LIFE CYCLE PHASE: <u>REQUIREMENTS ANALYSIS</u>		Form Code: <u>UsRAM.3</u>
☐ SYSTEM ☐ SUBSYSTEM ☐ MODULE	NAME: _____ _____ _____	SOURCE(S): _____ _____
I. <u>DATA COLLECTION WORKSECTION:</u> 1.0 <u>Flexibility of Input (23)</u> 1.1 Is there a definitive statement of the requirement for optional input media in the Requirements Analysis Phase? Yes = 1, No = 0 Y N		SCORE
II. <u>METRIC WORKSECTION:</u> $\text{Metric Value} = \frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$		
III. <u>EVALUATION WORKSECTION:</u> What is your evaluation of the reviewed products based on the data elements above? (1-10) _____ (Ø If you are unable to evaluate)		
IV. <u>INSPECTOR'S COMMENTS:</u> 		

PREPARED BY: _____ APPROVED BY: _____
 DATE: _____ DATE: _____

TRAINING CHECKLIST

Form Code: UsRAM.4

LIFE CYCLE PHASE: PRELIMINARY DESIGN		SOURCE(S): _____ _____
☐ SYSTEM	NAME: _____	
☐ SUBSYSTEM	_____	
☐ MODULE	_____	

I. <u>DATA COLLECTION WORKSECTION:</u>		SCORE
1.0 <u>Documentation of Lesson Plans/Training Material</u> (54)		
1.1 Are lesson plans/training materials provided for operators, users, and maintainers?	☐ Y ☐ N	☐
Yes = 1, No = 0		
2.0 <u>Realistic Simulated Exercises</u> (55)		
2.1 Are realistic, simulated exercises provided?	☐ Y ☐ N	☐
Yes = 1, No = 0		
3.0 <u>Sufficient "Help" and Diagnostic Information</u> (56)		
3.1 Are "Help" and diagnostic information provided?	☐ Y ☐ N	☐
Yes = 1, No = 0		
II. <u>METRIC WORKSECTION:</u>		
Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$		☐
III. <u>EVALUATION WORKSECTION:</u> What is your evaluation of the reviewed products based on the data elements above? (1-10) _____ (Ø If you are unable to evaluate)		
IV. <u>INSPECTOR'S COMMENTS:</u>		

PREPARED BY: _____ APPROVED BY: _____
DATE: _____ DATE: _____

OPERABILITY

Form Code: UsRAC.1

LIFE CYCLE PHASE:

REQUIREMENTS ANALYSIS

SOURCE(S):

UsRAM.1

☐ SYSTEM

NAME: _____

☐ SUBSYSTEM

☐ MODULE

I. METRIC SUMMARY WORKSECTION:

1. Operability Checklist

SCORE

☐

II. CRITERIA WORKSECTION:

Criteria Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Metrics}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the metrics above?
(1-10) _____ (# If you are unable to evaluate)

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

COMMUNICATIVENESS

Form Code: UsRAC.2

LIFE CYCLE PHASE:

REQUIREMENT ANALYSIS

SOURCE(S):

UsRAM.2

☐

SYSTEM

NAME: _____

☐

SUBSYSTEM

☐

MODULE

I. METRIC SUMMARY WORKSECTION:

1. User Output Interface Measure

2. User Input Interface Measure

SCORE

☐☐

II. CRITERIA WORKSECTION:

Criteria Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Metrics}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the metrics above?
(1-10) _____ (Ø If you are unable to evaluate)

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

<u>TRAINING</u>			Form Code: <u>UsRAC.3</u>
LIFE CYCLE PHASE: PRELIMINARY DESIGN		SOURCE(S): <u>UsRAM.4</u>	
☐ SYSTEM ☐ SUBSYSTEM ☐ MODULE	NAME: _____ _____ _____		
I. <u>METRIC SUMMARY WORKSECTION:</u> 1. Training Checklist			SCORE
II. <u>CRITERIA WORKSECTION:</u> Criteria Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Metrics}}$			
III. <u>EVALUATION WORKSECTION:</u> What is your evaluation of the reviewed products based on the metrics above? (1-10) _____ (Ø If you are unable to evaluate)			

PREPARED BY: _____ APPROVED BY: _____
 DATE: _____ DATE: _____

USABILITY

Form Code: UsRAF.1

LIFE CYCLE PHASE:

REQUIREMENT ANALYSIS

SOURCE(S):

UsRAC.1

UsRAC.2

☐ SYSTEM

NAME: _____

☐ SUBSYSTEM

☐ MODULE

UsRAC.3

I. CRITERIA SUMMARY WORKSECTION:

1. Operability
2. Communicativeness
3. Training

SCORE

☐
☐
☐

II. FACTOR WORKSECTION:

Factor Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Criteria}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the criteria above?
(1-10) _____ (# If you are unable to evaluate)

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

USABILITY

Complete this score chart if application of this set of worksheets is appropriate when products of A1, A2, B1 and B2 in Analysis Phase are available.

Data Element Number	Answer of Data Element	Data Element Score	Metric Score	Criteria Score	Factor Score
<u>20</u>					
<u>21</u>					
<u>22</u>					
<u>24</u>					
<u>25</u>					
<u>23</u>					
<u>54</u>					
<u>55</u>					
<u>56</u>					

FIRST MEASUREMENT Date _____

Complete this score chart if a second application of this set of Worksheets is appropriate for update when products of A1, A2, B1 and B2 in Analysis Phase are available.

Data Element Number	Answer of Data Element	Data Element Score	Metric Score	Criteria Score	Factor Score
<u>20</u>					
<u>21</u>					
<u>22</u>					
<u>24</u>					
<u>25</u>					
<u>23</u>					
<u>54</u>					
<u>55</u>					
<u>56</u>					

SECOND MEASUREMENT Date _____

OPERABILITY CHECKLIST

Form Code: UsPDM.1

LIFE CYCLE PHASE:

PRELIMINARY DESIGN

SOURCE(S):

☐ SYSTEM

NAME: _____

☐ SUBSYSTEM

☐ MODULE

I. DATA COLLECTION WORKSECTION:

SCORE

1.0 Operating Characteristics (20)

1.1 Are all steps in the operation described?

☐ Y ☐ N

Yes = 1, No = 0

2.0 Error Conditions and Responses (21)

2.1 Are all error conditions to be reported to the operator/user identified, and are the responses described?

☐ Y ☐ N

Yes = 1, No = 0

3.0 Operator's Capabilities (22)

3.1 Are provisions for the operator to interrupt operation, obtain status, modify, and continue processing provided in the Design Phase?

☐ Y ☐ N

Yes = 1, No = 0

4.0 Hard Copy Maintenance (53)

4.1 Is a hard copy of operator interactions to be maintained?

☐ Y ☐ N

Yes = 1, No = 0

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

OPERABILITY CHECKLIST (Continued)

Form Code: UsPDM.1

LIFE CYCLE PHASE: PRELIMINARY DESIGN		SOURCE(S): _____ _____ _____
☐ SYSTEM	NAME: _____	
☐ SUBSYSTEM	_____	
☐ MODULE	_____	

I. <u>DATA COLLECTION WORKSECTION (continued):</u>	SCORE
5.0 <u>Operator Messages</u> (140) 5.1 Are the interactions between the operator and systems simple and consistent? ☐ Y ☐ N Yes = 1, No = 0	☐
II. <u>METRIC WORKSECTION:</u> Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$	☐
III. <u>EVALUATION WORKSECTION:</u> What is your evaluation of the reviewed products based on the data elements above? (1-10) _____ (Ø If you are unable to evaluate)	
IV. <u>INSPECTOR'S COMMENTS:</u>	

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

USER INPUT INTERFACE MEASURE

Form Code: UsPDM.2

LIFE CYCLE PHASE:
PRELIMINARY DESIGN

SOURCE(S):

- ☐ SYSTEM
☐ SUBSYSTEM
☐ MODULE

NAME: _____

I. DATA COLLECTION WORKSECTION:

SCORE

1.0 Flexibility of Input (23)

1.1 Are provisions for input from different media provided in the design phase? ☐ Y ☐ N
Yes = 1, No = 0

☐

2.0 Uniform Input Formats (57)

2.1 Number of input formats ☐
Score = 1 + ☐ 2.1

☐

3.0 Default Values (58)

3.1 Number of default values. ☐
3.2 Number of input values. ☐
Score = ☐ 3.1 + ☐ 3.2

☐

4.0 Self-Identifying Inputs (59)

4.1 Number of records with self-defining input codes. ☐
4.2 Total Number of input records. ☐
Score = ☐ 4.1 + ☐ 4.2

☐

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

USER INPUT INTERFACE MEASURE (Continued)

Form Code: UsPDM.2

LIFE CYCLE PHASE:
PRELIMINARY DESIGN

SOURCE(S):

- ☐ SYSTEM
☐ SUBSYSTEM
☐ MODULE

NAME: _____

I. DATA COLLECTION WORKSECTION (continued):

SCORE

5.0 Input Verification (60)

5.1 Can input be verified by the user prior to execution?

☐ Y ☐ N

Yes = 1, No = 0

☐

6.0 Explicitly Defined Logical End of Input (61)

6.1 Is input terminated by explicitly defining the end of input?

☐ Y ☐ N

Yes = 1, No = 0

☐

II. METRIC WORKSECTION:

Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the data elements above?
(1-10) _____ (Ø If you are unable to evaluate)

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

USER OUTPUT INTERFACE MEASURE

Form Code: UsPDM.3

LIFE CYCLE PHASE:

PRELIMINARY DESIGN

SOURCE(S):

☐ SYSTEM

NAME: _____

☐ SUBSYSTEM

☐ MODULE

I. DATA COLLECTION WORKSECTION:

SCORE

1.0 Flexibility of Output (24)

1.1 Are provisions for directing output to different media provided in the Design and Implementation Phases?

Y N

Yes = 1, No = 0

2.0 Output Control (25)

2.1 Are provisions for selective output controls provided in the Design and Implementation Phases?

Y N

Yes = 1, No = 0

3.0 Techniques for Separating Logical Groups of Output (62)

3.1 Are logical groups of output separated for user examination?

Y N

Yes = 1, No = 0

4.0 Relationship Between Error Messages and Outputs (63)

4.1 Are the relationships between error messages and outputs unambiguous?

Y N

Yes = 1, No = 0

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

USER OUTPUT INTERFACE MEASURE (Continued)

Form Code: UsPDM.3

LIFE CYCLE PHASE:

PRELIMINARY DESIGN

SOURCE(S):

☐ SYSTEM

NAME: _____

☐ SUBSYSTEM

☐ MODULE

I. DATA COLLECTION WORKSECTION (continued):

SCORE

5.0 Unique Output Labels (141)

5.1 Do outputs have descriptive user-oriented labels?

☐ Y ☐ N

Yes = 1, No = 0

☐

6.0 Individual Output Items (142)

6.1 Do outputs have user oriented units?

☐ Y ☐ N

Yes = 1, No = 0

☐

7.0 Uniform Output Formats (143)

7.1 Number of Output formats?

☐

Score = 1 + ☐ 7.1

☐

II. METRIC WORKSECTION:

Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the data elements above?
(1-10) _____ (# If you are unable to evaluate)

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

OPERABILITY

Form Code: UsPDC.1

LIFE CYCLE PHASE:

PRELIMINARY DESIGN

SOURCE(S):

UsPDM.1

☐ SYSTEM

NAME: _____

☐ SUBSYSTEM

☐ MODULE

I. METRIC SUMMARY WORKSECTION:

1. Operability Checklist

SCORE

☐

II. CRITERIA WORKSECTION:

Criteria Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Metrics}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the metrics above?
(1-10) _____ (# If you are unable to evaluate)

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

COMMUNICATIVENESS

Form Code: UsPDC.2

LIFE CYCLE PHASE:
PRELIMINARY DESIGN

SOURCE(S):
UsPDM.2 UsPDM.3

- ☐ SYSTEM
☐ SUBSYSTEM
☐ MODULE

NAME: _____

I. METRIC SUMMARY WORKSECTION:

1. User Input Interface Measure
2. User Output Interface Measure

SCORE

☐☐

II. CRITERIA WORKSECTION:

Criteria Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Metrics}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the metrics above?
(1-10) _____ (Ø If you are unable to evaluate)

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

<u>USABILITY</u>			Form Code: <u>UsPDF.1</u>
LIFE CYCLE PHASE: PRELIMINARY DESIGN		SOURCE(S): <u>UsPDC.1</u> <u>UsPDC.2</u>	
☐ SYSTEM ☐ SUBSYSTEM ☐ MODULE	NAME: _____ _____ _____		
I. <u>CRITERIA SUMMARY WORKSECTION:</u> 1. Operability 2. Communicativeness			SCORE ☐ ☐
II. <u>FACTOR WORKSECTION:</u> $\text{Factor Value} = \frac{\text{Sum of Above Scores}}{\text{No. of Criteria}}$			☐
III. <u>EVALUATION WORKSECTION:</u> What is your evaluation of the reviewed products based on the criteria above? (1-10) _____ (Ø If you are unable to evaluate)			

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

USABILITY

Complete this score chart if application of this set of worksheets is appropriate when products of B3 and C in Analysis Phase are available.

<u>Data Element Number</u>	<u>Answer of Data Element</u>	<u>Data Element Score</u>	<u>Metric Score</u>	<u>Criteria Score</u>	<u>Factor Score</u>
<u>20</u>					
<u>21</u>					
<u>22</u>					
<u>53</u>					
<u>140</u>					
<u>23</u>					
<u>57</u>					
<u>58</u>					
<u>59</u>					
<u>60</u>					
<u>61</u>					
<u>24</u>					
<u>25</u>					
<u>62</u>					
<u>63</u>					
<u>141</u>					
<u>142</u>					
<u>143</u>					

FIRST MEASUREMENT

Date _____

USABILITY

Complete this score chart if a second application of this set of worksheets is appropriate for update when products of C1 and C2 in Design Phase are available.

<u>Data Element Number</u>	<u>Answer of Data Element</u>	<u>Data Element Score</u>	<u>Metric Score</u>	<u>Criteria Score</u>	<u>Factor Score</u>
<u>20</u>					
<u>21</u>					
<u>22</u>					
<u>53</u>					
<u>140</u>					
<u>23</u>					
<u>57</u>					
<u>58</u>					
<u>59</u>					
<u>60</u>					
<u>61</u>					
<u>24</u>					
<u>25</u>					
<u>62</u>					
<u>63</u>					
<u>141</u>					
<u>142</u>					
<u>143</u>					

SECOND MEASUREMENT

Date _____

USABILITY

Complete this score chart if a third application of this set of worksheets is appropriate for update when products of A1, A2, and B-D1 in Test and Integration Phase are available.

<u>Data Element Number</u>	<u>Answer of Data Element</u>	<u>Data Element Score</u>	<u>Metric Score</u>	<u>Criteria Score</u>	<u>Factor Score</u>
<u>20</u>					
<u>21</u>					
<u>22</u>					
<u>53</u>					
<u>140</u>					
<u>23</u>					
<u>57</u>					
<u>58</u>					
<u>59</u>					
<u>60</u>					
<u>61</u>					
<u>24</u>					
<u>25</u>					
<u>62</u>					
<u>63</u>					
<u>141</u>					
<u>142</u>					
<u>143</u>					

THIRD MEASUREMENT

Date _____

RELIABILITY

Complete this score chart if application of this set of worksheets is appropriate for update when products of A1, A2 and B-D1 in Test and Integration Phase are available.

<u>Data Element Number</u>	<u>Answer of Data Element</u>	<u>Data Element Score</u>	<u>Metric Score</u>	<u>Criteria Score</u>	<u>Factor Score</u>
<u>20</u>					
<u>21</u>					
<u>22</u>					
<u>53</u>					
<u>140</u>					
<u>23</u>					
<u>57</u>					
<u>58</u>					
<u>59</u>					
<u>60</u>					
<u>61</u>					
<u>24</u>					
<u>25</u>					
<u>62</u>					
<u>63</u>					
<u>141</u>					
<u>142</u>					
<u>143</u>					

FOURTH MEASUREMENT

Date _____

QUALITY FACTOR

MODULE NO. 6

MAINTAINABILITY

TABLE OF CONTENTS

<u>TITLE</u>	<u>PAGE</u>
<u>INTRODUCTION AND INSTRUCTIONS FOR MAINTAINABILITY MODULE</u>	
INTRODUCTION TO MAINTAINABILITY	Ma-1
STEPS FOR COMPLETING WORKSHEETS	Ma-5
STEPS FOR UPDATE APPLICATIONS	Ma-8
HOW TO USE SCORE CHART SETS	Ma-9
ESD PRODUCTS FOR ANALYSIS PHASE	Ma-12
ESD PRODUCTS FOR DESIGN PHASE	Ma-13
ESD PRODUCTS FOR CODING AND CHECKING PHASE. .	Ma-14
ESD PRODUCTS FOR TEST AND INTEGRATION PHASE .	Ma-15
 <u>QUALITY FACTOR NO. 6 MAINTAINABILITY WORKSHEETS</u>	
WORKSHEETS FOR PRELIMINARY DESIGN PHASE . . .	Ma-16
WORKSHEETS FOR DETAIL DESIGN PHASE.	Ma-23
WORKSHEETS FOR IMPLEMENTATION PHASE	Ma-36

This QUALITY FACTOR MODULE is one of a set of eleven modules that are components of the "COMPUTER SYSTEMS ACQUISITION METRICS HANDBOOK".

INTRODUCTION AND INSTRUCTIONS
FOR
MAINTAINABILITY MODULE

INTRODUCTION TO MAINTAINABILITY

The Quality Factor Maintainability represents a measure of the effort required to locate and fix an error in an operational program. FIGURES Ma - 1 through Ma - 4 represent the hierarchy of Metric, Criteria and Quality Factor worksheets associated with Maintainability in Requirements Analysis, Preliminary Design, Detailed Design and Implementation phases of the Software Development Life Cycle.

The worksheets in this module are grouped into four separate sets, one set for each Life Cycle phase. Each set consists of Metric worksheets, Criteria worksheets, a Factor worksheet and score charts.

METRIC WORKSHEETS

One or more DATA COLLECTION WORKSECTIONS which contain the data element scores for each Metric, and each Metric's Final Score.

CRITERIA WORKSHEETS

One or more METRIC SUMMARY WORKSECTIONS which contain the Metrics scores for each Criteria, and each Criteria's Final Score.

FACTOR WORKSHEETS

One CRITERIA SUMMARY WORKSECTION which contains each Criteria's score, and the Final Score for the Factor for that phase.

SCORE CHARTS:

One or more charts that record worksheet values throughout the Life Cycle.

However, the sequence in which the worksheet sets are applied is dependent on the availability of ESD Computer Program Life Cycle products. Usually the worksheets will be applied sequentially, except for updates.

These instructions show when the Maintainability worksheet sets and Score Charts are applied during the Computer Program Life Cycle. The Product Code referred to on the Score Charts is the code defined in the ESD Guidebook Series, Software Acquisition Management Guidebook, Life Cycle Events and reillustrated in the General Instructions. The Product Tables map the ESD Computer Program Life Cycle Products to the Metric Worksheets. The balance of these instructions are step-by-step procedures for completing the worksheets and score chart summaries.

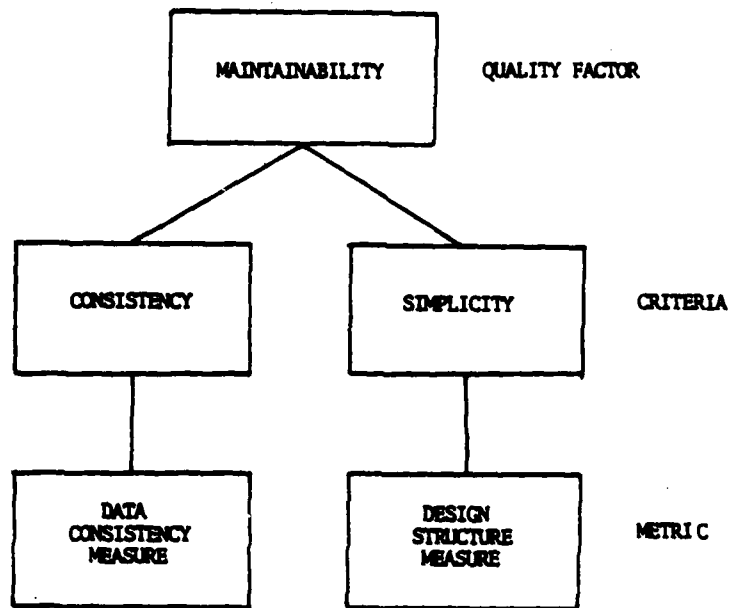


FIGURE Ma-1
PRELIMINARY DESIGN WORKSHEET HIERARCHY

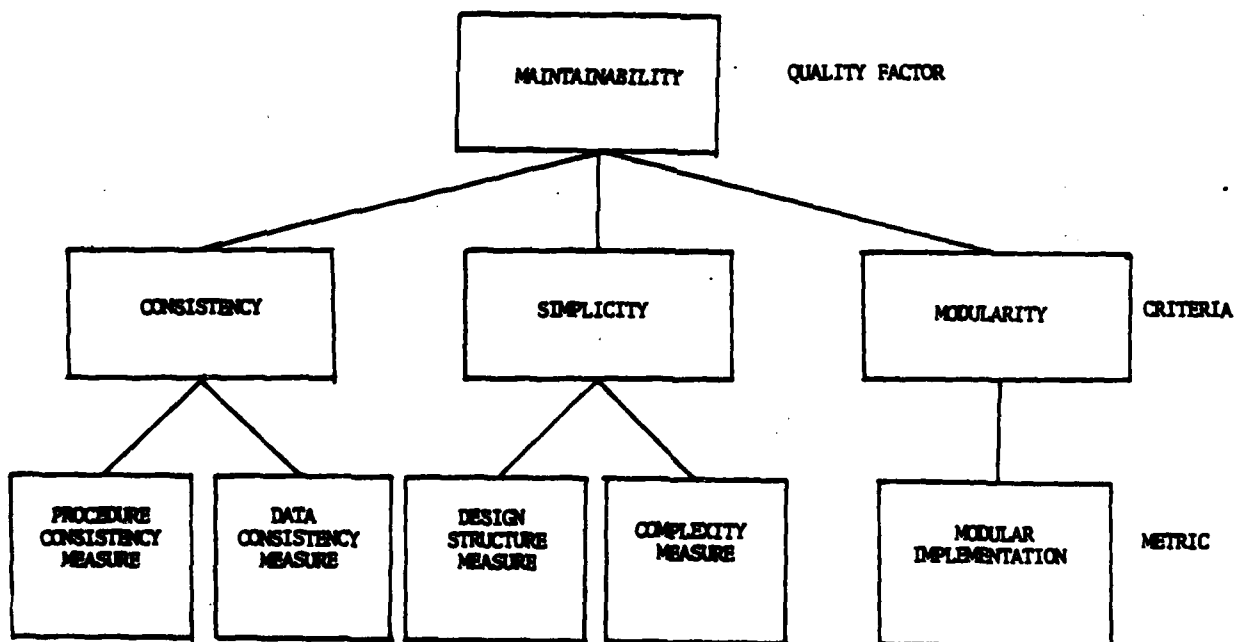


FIGURE Ma-2
DETAILED DESIGN WORKSHEET HIERARCHY

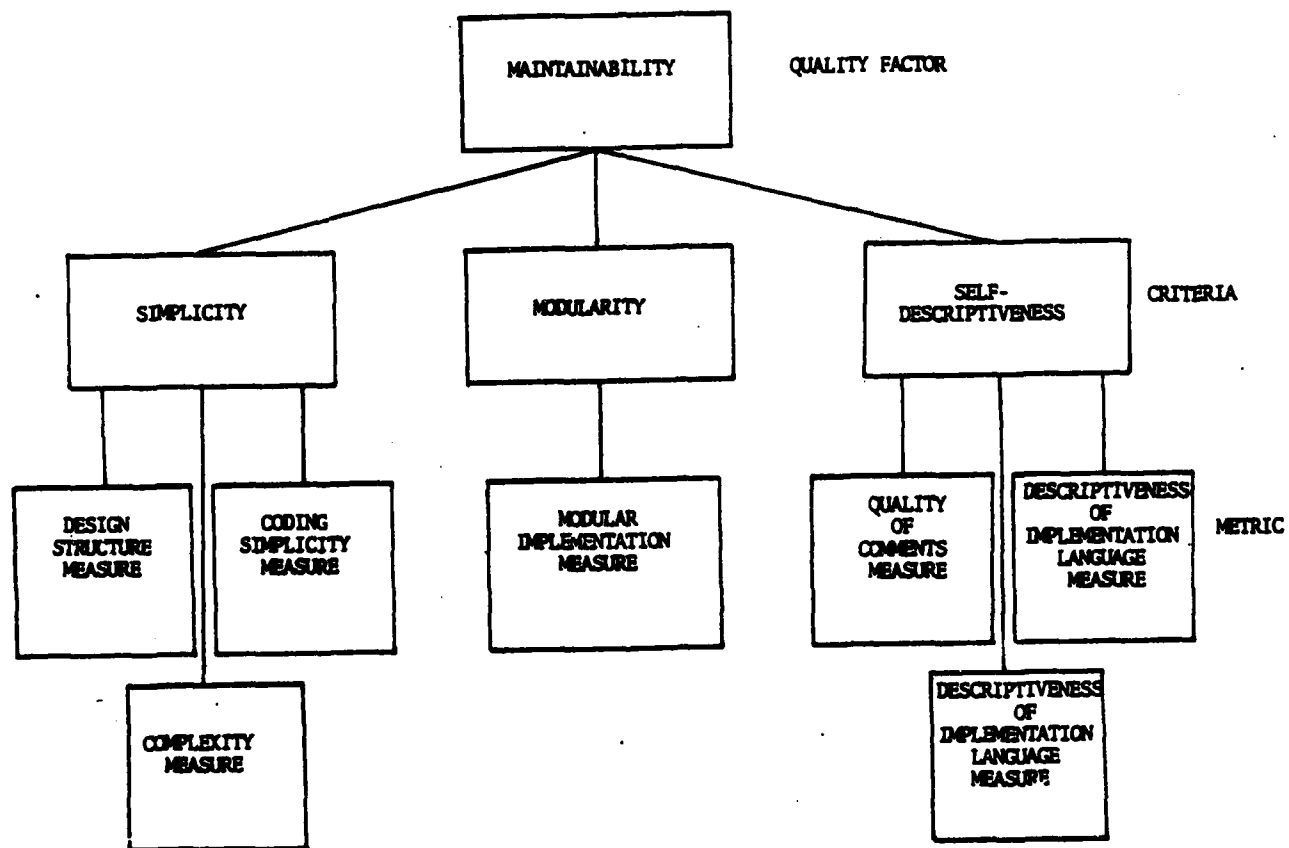


FIGURE Ma-3
IMPLEMENTATION WORKSHEET HIERARCHY

STEPS FOR COMPLETING WORKSHEETS

Step 1

Enter the appropriate information in the following blocks:

- (1.1) SYSTEM/SUBSYSTEM/MODULE block-Indicate the level of application.
- (1.2) NAME block-List the name of the system being measured.
- (1.3) SOURCE block-On Metric Worksheets, list the source document.
- (1.4) The PREPARED BY and DATE blocks should contain the name of the person performing the software metrics, and the current date.

Step 2

Determine the current Computer Program Life Cycle Phase. This module is concerned with four phases of the Computer Program Life Cycle:

- (2.1) Requirements Analysis
- (2.2) Preliminary Design
- (2.3) Detail Design
- (2.4) Implementation

Step 3

Determine the available products from the phase and which data worksheet set to apply. Each Life Cycle phase has at least three different activities associated with it. The result of the completion of an activity is one or more documents called products.

Before a worksheet set can be applied, specific products associated with it must be obtained. The Product Tables, at the end of the instructions, detail the products required for each worksheet set.

Step 4 - METRIC WORKSHEETS

- (4.1) Answer each question in the Data Collection Worksection as it applies to the system/subsystem/module you are measuring and transfer its scored value to its corresponding SCORE block.

If the question calls for a YES/NO type response, a YES answer is scored at a 1.

a NO answer is scored as a 0.

The questions that call for a numeric quantity type response have specific instructions on how to score the response. Follow the instructions under each data element.

- (4.2) Find the Metric Value by following the algorithm on the worksheet.
- (4.3) Answer the Evaluation Worksection - Evaluate the products based on the data elements as they apply to the system.
- (4.4) When you have repeated this procedure for all the Metric Worksheets in the set, you are ready to use the Criteria Worksheets.

Step 5 - CRITERIA WORKSHEETS

- (5.1) Each numbered item in the Metric Summary Worksection represents an individual Metric Value.

- (5.2) Find the Form Code in the SOURCE box of the Criteria Worksheet.
- (5.3) Find the Metric Worksheet with the same Form Code and transfer its Metric Value into the box to the right of the item in the Criteria Worksheet.
- (5.4) Repeat this process for all items in the Metric Summary Worksection.
- (5.5) Find the Criteria Value by following the algorithm on the worksheet.
- (5.6) Answer the Evaluation Worksection - evaluate the products based on the Metrics as they apply to the system.

Step 6 - FACTOR WORKSHEETS

- (6.1) Each numbered item in the Criteria Summary Worksection represents an individual Criterion Value.
- (6.2) Find the Form Code in the SOURCE box of the Factor Worksheet.
- (6.3) Find the Criteria Worksheet with the same Form Code and transfer its Criteria Value into the box in the Score column in the Factor Worksheet.
- (6.4) Repeat this process for all items in the Criteria Summary Worksection.
- (6.5) Answer the Evaluation Worksection - evaluate the products based on the Criteria as they apply to the system.
- (6.6) Find the Factor Value by following the algorithm on the Worksheet.

STEPS FOR UPDATE APPLICATIONS

Step 1

Determine the update necessary. The Product Tables at the end of these instructions list the updates required and the activities and products associated with each update. Also review Section 2.3.2, "Update Information Requirements", in the General Instructions Handbook for further information if necessary.

Step 2

Obtain the required products. The Products Tables at the end of these Instructions list the products required for each update application.

Step 3

Reapply the Metric, Criteria, and Factor worksheets by following the procedure already outlined in "Steps for Completing Worksheets", of these Instructions. "How to Use Score Chart sets", explains the procedure for reporting the update scores.

HOW TO USE SCORE CHART SETS

When you apply worksheets to system/subsystem/module, you must apply some worksheets more than once in the Computer Program Life Cycle. Because of this, a Score Chart set is organized so that the groups of worksheet scores, acquired at the times a set of worksheets is applied, can be recorded separately: originals & updates.

The Score Chart set (at the end of each worksheet set) is composed of similar tree structure diagrams. Each Score Chart represents the complete hierarchy of scores to be acquired during any one application of worksheets sets in the Life Cycle.

When applying any worksheet, in order to record scores you must locate and use the Score Chart that corresponds to the current phase in the Life Cycle. In a Score Chart set, the first Score Chart (labeled FIRST MEASUREMENT) is designed to receive the scores from the first application of a worksheet set in the Life Cycle, and the following charts (i.e., labeled SECOND MEASUREMENT, etc.) are designed to receive the scores from the updates.

Each data element in the Metrics Worksheet has a unique number in the Data Element Dictionary, which is listed in the first column in the Score Chart. The next two columns of boxes in a Score Chart show a worksheet set's individual data element raw scores and its interpreted response (Yes/No, = 1 or 0, etc.). The last three box columns map out the Metric, Criteria and Factor worksheets of a set, each box representing the total score of a corresponding worksheet.

Once you have finished scoring a Worksheet set and located the corresponding Score Chart set, use the following procedure for filling out the Score Chart:

Step 1 - ANSWER OF DATA ELEMENT/DATA ELEMENT SCORE

For each data element in a Metric Worksheet:

- (1.1) Reference its number in the "Data Element Number" Column in the Score Chart.
- (1.2) Transfer the answers you gave to the questions in the Data Collection Worksection to the corresponding box under the column headed "Answer of Data Element"
- (1.3) Transfer the Scores of the data element from the Data Collection Worksection to its corresponding box under column labeled "Data Element Score".
- (1.4) Repeat this step for all data elements within this phase.

Step 2 - METRIC SCORE

Each box in this column represents the Score from the Metric Worksection of a Metric Worksheet. Transfer the Metric Value from each Metric Worksheet into the corresponding boxes in the Score Chart's Metric Score Column.

Step 3 - CRITERIA SCORE

Each box in this column represents the score from the Criteria Worksection of a Criteria worksheet into the corresponding boxes of the Score Chart's Criteria Score Column.

Step 4 - FACTOR SCORE

Each box in this column represents the score from the Factor Worksection of a Quality Factor Worksheet. Transfer the Factor from the set's Factor Worksheet into corresponding boxes of the Score Chart's Factor Score Column.

These Score Chart sets will provide a historical base for repeated application of the metrics to a system at all levels. They are also a useful means of reporting your finds to the program manager in a condensed and compact form.

PRODUCTS	TRADE-OFF STUDY REPORTS	INITIAL OR AUTHENTICATED SYSTEM SPEC, SEGMENT SPEC	AUTHENTICATED DEVELOPMENT SPEC FOR CPCI	HIGHER LEVEL SPEC	DRAFT PRODUCT SPECS	PDR MINUTES AND ACTION ITEM RESPONSES
WORKSHEET SET TO BE APPLIED	REQUIREMENTS ANALYSIS WORKSHEETS				PRELIMINARY DESIGN WORKSHEETS	

ESD PRODUCTS FOR ANALYSIS PHASE

Apply the Requirement Analysis Worksheets as the following types of products become available. See note below.

- Product A.1 - Trade-off Study Reports
- Product A.2 - Initial or Authenticated System Specification & Segment Specification (if any)
- Product B.1 - Authenticated Development Specification for each CPCI
- Product B.2 - Possible higher-level specification, ICD and changes

Apply the Preliminary Design Worksheets as the following types of products become available. See note below.

- Product B.3 - Parts of draft Product Specifications containing design approaches for each CPCI
- Product C. - PDR minutes and action item responses

NOTE: If these products do not contain the information requested by the Data Element questions, other contractor-supplied information should be searched.

PRODUCTS	FUNCTIONAL FLOW CHARTS	DE- TAILED FLOW CHART	DATA FORMAT DESC.	ALGO- RITHM DESC.	PRELIMI- NARY PRODUCT DESC.	CDR MINUTES ACTION ITEM RESPON- SES	SYSTEM SEG- MENT TEST PLANS	PRELIM. CPCI TEST PRO- CEDURES
WORKSHEET SET TO BE APPLIED	DETAILED DESIGN WORKSHEETS						PRELIMINARY DESIGN WORKSHEETS, (UPDATE)	

ESD PRODUCTS FOR DESIGN PHASE

Apply the Detailed Design Worksheets as the following types of products become available. See note below.

- Product A.1: Functional flowcharts
- Product A.2: Detailed flowcharts
- Product A.3: Data format descriptions
- Product A.4: Descriptions of algorithms not previously prescribed
- Product B. : Preliminary Product Specifications, including the above
- Product D. : CDR minutes & action item responses

Apply the Preliminary Design Worksheets for Update as the following types of products become available. See note.

- Product C.1: System, Segment and CPCI Test Plans
- Product C.2: Preliminary CPCI Test Procedures

NOTE: If these products do not contain the information requested by the Data Element questions, other contractor-supplied information should be searched.

PRODUCTS	CODE	ALTERED PRODUCT SPECS
WORKSHEET SET TO BE APPLIED	IMPLEMENTATION WORKSHEETS	DETAILED DESIGN WORKSHEETS (UPDATE)

ESD PRODUCTS FOR CODING AND CHECKING PHASE

Apply the Implementation Worksheets as the code becomes available.

Apply the Detailed Design Worksheets for Update as the following types of products become available. See note below.

- Product C. - Altered Product Specifications, including compiler/assembly listings.

NOTE: If these products do not contain the information requested by the Data Element questions, other contractor-supplied information should be searched.

PRODUCTS	FINAL CPCI TEST PROCEDURES	SEGMENT & SYSTEM LEVEL TEST PROCEDURES	TEST REPORTS	CODING CHANGES	MODIFIED PRODUCT SPECS	HIGH LEVEL SPECS
WORKSHEET SET TO BE APPLIED	PRELIMINARY DESIGN WORKSHEETS			IMPLEMEN- TATION WORKSHEETS	DETAILED DESIGN WORKSHEETS (UPDATE)	

ESD PRODUCTS FOR TEST AND
INTEGRATION PHASE

Apply the Preliminary Design Worksheets for Update as the following types of products become available. See note below.

- A Product 1: Final CPCI Test Procedures
- Product 2: Segment (if any) and system-level Test Procedures

- B-D Product 1: Test Reports

Apply the Implementation Worksheets for Update as the following types of products become available. See note below.

- B-D Product 2: Computer Program Coding Changes

Apply the Detailed Design Worksheets for Update as the following types of products become available. See note.

- B-D Product 3: Modified Product Specification
- Product 4: Possible high-level specification, ICD and changes.

NOTE: If these products do not contain the information requested by the Data Element questions, other contractor-supplied information should be searched.

DATA CONSISTENCY MEASURE

Form Code: MaPTM.1

LIFE CYCLE PHASE:

PRELIMINARY DESIGN

SOURCE(S):

☐ SYSTEM

NAME: _____

☐ SUBSYSTEM

☐ MODULE

I. DATA COLLECTION WORKSECTION:

SCORE

1.0 Global Data (42)

1.1 On this level, is global data defined only once?

☐ Y ☐ N

Yes = 1, No = 0

2.0 Standard Data Usage Representation (144)

2.1 Is standard design representation for data usage established?

☐ Y ☐ N

Yes = 1, No = 0

II. METRIC WORKSECTION:

Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the data elements above?
(1-10) _____ (§ If you are unable to evaluate)

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

DESIGN STRUCTURE MEASURE

Form Code: MaPDM.2

LIFE CYCLE PHASE:
PRELIMINARY DESIGN

SOURCE(S):

- ☐ SYSTEM
☐ SUBSYSTEM
☐ MODULE

NAME: _____

I. DATA COLLECTION WORKSECTION:

SCORE

1.0 Hierarchical Structure (35)

1.1 Is a hierarchical chart provided which identifies all modules in the system?

☐ Y ☐ N

Yes = 1, No = 0

☐

2.0 Module Independence (36)

2.1 Is the module independent of the source of the input or the destination of the output?

☐ Y ☐ N

Yes = 1, No = 0

☐

3.0 Size of Data Base (70)

3.1 Number of unique data items in data base.

☐

☐

Score = 1 + ☐ 3.1

II. METRIC WORKSECTION:

Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the data elements above?
(1-10) _____ (0 If you are unable to evaluate)

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

CONSISTENCY

Form Code: MaPDC.1

LIFE CYCLE PHASE:

PRELIMINARY DESIGN

SOURCE(S):

Ma PDM.1

☐ SYSTEM

NAME: _____

☐ SUBSYSTEM

☐ MODULE

I. METRIC SUMMARY WORKSECTION:

1. Data Consistency Measure

SCORE

☐

II. CRITERIA WORKSECTION:

Criteria Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Metrics}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the metrics above?
(1-10) _____ (Ø If you are unable to evaluate)

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

SIMPLICITY

Form Code: MaPDC.2

LIFE CYCLE PHASE:

PRELIMINARY DESIGN

SOURCE(S):

MaPDM.2

☐ SYSTEM

NAME: _____

☐ SUBSYSTEM

☐ MODULE

I. METRIC SUMMARY WORKSECTION:

1. Design Structure Measure

SCORE

☐

II. CRITERIA WORKSECTION:

Criteria Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Metrics}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the metrics above?
(1-10) _____ (Ø If you are unable to evaluate)

PREPARED BY: _____

APPROVED BY: _____

DATE: _____

DATE: _____

MAINTAINABILITY

Form Code: MaPDF.1

LIFE CYCLE PHASE:

PRELIMINARY DESIGN

SOURCE(S):

MaPDC.1

MaPDC.2

☐ SYSTEM

NAME: _____

☐ SUBSYSTEM

☐ MODULE

I. CRITERIA SUMMARY WORKSECTION:

1. Consistency

2. Simplicity

SCORE

☐
☐

II. FACTOR WORKSECTION:

Factor Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Criteria}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the criteria above?
(1-10) _____ (Ø If you are unable to evaluate)

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

MAINTAINABILITY

Complete this score chart if application of this set of worksheets is appropriate when products of B3 and C in Analysis Phase are available.

<u>Data Element Number</u>	<u>Answer of Data Element</u>	<u>Data Element Score</u>	<u>Metric Score</u>	<u>Criteria Score</u>	<u>Factor Score</u>
<u>42</u>					
<u>144</u>					
<u>35</u>					
<u>36</u>					
<u>70</u>					

FIRST MEASUREMENT Date

Complete this score chart if a second application of this set of worksheets is appropriate when products of C1 and C2 in Design Phase are available.

<u>Data Element Number</u>	<u>Answer of Data Element</u>	<u>Data Element Score</u>	<u>Metric Score</u>	<u>Criteria Score</u>	<u>Factor Score</u>
<u>42</u>					
<u>144</u>					
<u>35</u>					
<u>36</u>					
<u>70</u>					

SECOND MEASUREMENT Date

MAINTAINABILITY

Complete this score chart if a third application of this set of worksheets is appropriate when products of A1, A2, and B-D1 in Test and Integration Phase are available.

Data Element Number	Answer of Data Element	Data Element Score	Metric Score	Criteria Score	Factor Score
<u>42</u>					
<u>144</u>					
<u>35</u>					
<u>36</u>					
<u>70</u>					

THIRD MEASUREMENT

Date _____

Complete this score chart if application of this set of worksheets is appropriate for update when products of A1, A2 and B-D1 in Test and Integration Phase are available.

Data Element Number	Answer of Data Element	Data Element Score	Metric Score	Criteria Score	Factor Score
<u>42</u>					
<u>144</u>					
<u>35</u>					
<u>36</u>					
<u>70</u>					

FOURTH MEASUREMENT

Date _____

PROCEDURE CONSISTENCY MEASURE

Form Code: MaDDM.1

LIFE CYCLE PHASE:

DETAIL DESIGN

SOURCE(S):

- ☐ SYSTEM
☐ SUBSYSTEM
☐ MODULE

NAME: _____

I. DATA COLLECTION WORKSECTION:

SCORE

1.0 Standard Design Representation (101)

- 1.1 Does the design representation
 comply with established standards? ☐ Y ☐ N
 Yes = 1, No = 0

☐

2.0 Input/Output Conventions (102)

- 2.1 Do input/output references comply
 with established standards? ☐ Y ☐ N
 Yes = 1, No = 0

☐

3.0 Calling Sequence Conventions (103)

- 3.1 Do calling sequences comply with
 established standards? ☐ Y ☐ N
 Yes = 1, No = 0

☐

4.0 Error Handling Conventions (104)

- 4.1 Is error handling done according
 to established standards? ☐ Y ☐ N
 Yes = 1, No = 0

☐

II. METRIC WORKSECTION:

Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$

☐

**III. EVALUATION WORKSECTION: What is your evaluation of the
 reviewed products based on the data elements above?
 (1-10) _____ (Ø If you are unable to evaluate)**

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

DATA CONSISTENCY MEASURE

Form Code: MaDDM.2

LIFE CYCLE PHASE:

DETAIL DESIGN

SOURCE(S):

- ☐ SYSTEM
☐ SUBSYSTEM
☐ MODULE

NAME: _____

I. DATA COLLECTION WORKSECTION:

SCORE

1.0 Global Data (42)

1.1 On this level, are global variables used as defined globally?

☐ Y ☐ N

Yes = 1, No = 0

☐

2.0 Naming Conventions (105)

2.1 Are variables named according to established standards?

☐ Y ☐ N

Yes = 1, No = 0

☐

II. METRIC WORKSECTION:

Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$

☐

**III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the data elements above?
 (1-10) _____ (Ø If you are unable to evaluate)**

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

DESIGN STRUCTURE MEASURE

Form Code: MaDDM.3

LIFE CYCLE PHASE:

DETAIL DESIGN

SOURCE(S):

☐ SYSTEM

NAME: _____

☐ SUBSYSTEM

☐ MODULE

I. DATA COLLECTION WORKSECTION:

SCORE

1.0 Module Processing not Dependent on Prior Processing (82)

1.1 Is the module independent of knowledge of prior processing?

☐ Y ☐ N

Yes = 1, No = 0

2.0 Entrance and Exit of the Module (83)

2.1 Number of entrances into modules.

2.2 Number of exits from module.

Score = $\left[1 + \boxed{2.1} + 1 \right] + \left[1 + \boxed{2.2} + 1 \right]$

3.0 Description of Input, Output, Processing and Limitations. (138)

3.1 Does each module description include input, output, processing and limitations?

☐ Y ☐ N

Yes = 1, No = 0

II. METRIC WORKSECTION:

Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the data elements above? (1-10) _____ (Ø If you are unable to evaluate)

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

COMPLEXITY MEASURE

Form Code: MaDDM.4

LIFE CYCLE PHASE:

DETAIL DESIGN

SOURCE(S):

☐ SYSTEM

NAME: _____

☐ SUBSYSTEM

☐ MODULE

I. DATA COLLECTION WORKSECTION:

SCORE

1.0 Data and Control Flow Complexity (81)

1.1 What is the sum of the number of
decision points, subdecision points,
conditional branches and uncondi-
tional branches?

Score = 1 + $\boxed{1.1} + 1$

II. METRIC WORKSECTION:

Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$

III. EVALUATION WORKSECTION: What is your evaluation of the
reviewed products based on the data elements above?
(1-10) _____ (0 If you are unable to evaluate)

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

MODULAR IMPLEMENTATION MEASURE

Form Code: MaDDM.5

LIFE CYCLE PHASE:
DETAIL DESIGN

SOURCE(S):

- ☐ SYSTEM
☐ SUBSYSTEM
☐ MODULE

NAME: _____

I. DATA COLLECTION WORKSECTION:

SCORE

1.0 Controlling Parameters (87)

1.1 Number of calling sequence parameters that are control variables. ☐

1.2 Number of calling sequence parameters. ☐

Score = +

☐

2.0 Controlling Input (88)

2.1 Is input passed as calling sequence parameters? ☐ Y ☐ N

Yes = 1, No = 0

☐

3.0 Controlling Output (89)

3.1 Is output data passed back to calling module? ☐ Y ☐ N

Yes = 1, No = 0

☐

4.0 Controlling Return (90)

4.1 Is control returned to calling module? ☐ Y ☐ N

Yes = 1, No = 0

☐

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

MODULAR IMPLEMENTATION MEASURE

Form Code: MaDDM.5

LIFE CYCLE PHASE:
DETAIL DESIGN

SOURCE(S):

- ☐ SYSTEM
☐ SUBSYSTEM
☐ MODULE

NAME: _____

I. DATA COLLECTION WORKSECTION (continued):

SCORE

5.0 Share Temporary Storage (91).

5.1 Is temporary storage independent of other modules?

☐ Y ☐ N

Yes = 1, No = 0

☐

II. METRIC WORKSECTION:

Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the data elements above?
(1-10) _____ (If you are unable to evaluate)

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

CONSISTENCY

Form Code: MaDDC.1

LIFE CYCLE PHASE:
DETAIL DESIGN

SOURCE(S):

MaDDM.1

MaDDM.2

- ☐ SYSTEM
☐ SUBSYSTEM
☐ MODULE

NAME: _____

I. METRIC SUMMARY WORKSECTION:

1. Procedure Consistency Measure
2. Data Consistency Measure

SCORE

☐☐

II. CRITERIA WORKSECTION:

Criteria Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Metrics}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the metrics above?
(1-10) _____ (# If you are unable to evaluate)

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

SIMPLICITY

Form Code: MaDDC.2

LIFE CYCLE PHASE:

DETAIL DESIGN

SOURCE(S):

MaDDM.4

MaDDM.3

☐ SYSTEM

NAME: _____

☐ SUBSYSTEM

☐ MODULE

I. METRIC SUMMARY WORKSECTION:

1. Design Structure Measure
2. Complexity Measure

SCORE

☐☐

II. CRITERIA WORKSECTION:

Criteria Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Metrics}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the metrics above?
(1-10) _____ (# If you are unable to evaluate)

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

<u>MODULARITY</u>		Form Code: <u>MaDDC.3</u>
LIFE CYCLE PHASE: DETAIL DESIGN		SOURCE(S): <u>MaDDM.5</u>
☐ SYSTEM ☐ SUBSYSTEM ☐ MODULE	NAME: _____ _____ _____	_____ _____
I. <u>METRIC SUMMARY WORKSECTION:</u> 1. Modular Implementation Measure		SCORE
II. <u>CRITERIA WORKSECTION:</u> $\text{Criteria Value} = \frac{\text{Sum of Above Scores}}{\text{No. of Metrics}}$		
III. <u>EVALUATION WORKSECTION:</u> What is your evaluation of the reviewed products based on the metrics above? (1-10) _____ (§ If you are unable to evaluate)		

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

MAINTAINABILITY

Form Code: MaDDF.1

LIFE CYCLE PHASE:

DETAIL DESIGN

SOURCE(S):

MaDDC.1

MaDDC.2

☐ SYSTEM

NAME: _____

☐ SUBSYSTEM

☐ MODULE

MaDDC.3

I. CRITERIA SUMMARY WORKSECTION:

1. Consistency

2. Simplicity

3. Modularity

SCORE

☐
☐
☐

II. FACTOR WORKSECTION:

Factor Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Criteria}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the criteria above?
(1-10) _____ (§ If you are unable to evaluate)

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

MAINTAINABILITY

Complete this score chart if application of this set of worksheets is appropriate when products of A1, A2, A3, A4, B and D in Design Phase are available

<u>Data Element Number</u>	<u>Answer of Data Element</u>	<u>Data Element Score</u>	<u>Metric Score</u>	<u>Criteria Score</u>	<u>Factor Score</u>
<u>101</u>					
<u>102</u>					
<u>103</u>					
<u>104</u>					
<u>42</u>					
<u>105</u>					
<u>81</u>					
<u>82</u>					
<u>83</u>					
<u>138</u>					
<u>87</u>					
<u>88</u>					
<u>89</u>					
<u>90</u>					
<u>91</u>					

FIRST MEASUREMENT

Date _____

MAINTAINABILITY

Complete this score chart if a second application of this set of Worksheets is appropriate for update when products of C in Coding and Checkout Phase is available.

<u>Data Element Number</u>	<u>Answer of Data Element</u>	<u>Data Element Score</u>	<u>Metric Score</u>	<u>Criteria Score</u>	<u>Factor Score</u>
<u>101</u>					
<u>102</u>					
<u>103</u>					
<u>104</u>					
<u>42</u>					
<u>105</u>					
<u>81</u>					
<u>82</u>					
<u>83</u>					
<u>138</u>					
<u>87</u>					
<u>88</u>					
<u>89</u>					
<u>90</u>					
<u>91</u>					

SECOND MEASUREMENT

Date _____

MAINTAINABILITY

Complete this score chart if a third application of this set of Worksheets is appropriate for update when products of B-D3 and B-D4 in Test and Integration Phase are available.

<u>Data Element Number</u>	<u>Answer of Data Element</u>	<u>Data Element Score</u>	<u>Metric Score</u>	<u>Criteria Score</u>	<u>Factor Score</u>
<u>101</u>					
<u>102</u>					
<u>103</u>					
<u>104</u>					
<u>42</u>					
<u>105</u>					
<u>81</u>					
<u>82</u>					
<u>83</u>					
<u>138</u>					
<u>87</u>					
<u>88</u>					
<u>89</u>					
<u>90</u>					
<u>91</u>					

THIRD MEASUREMENT

Date _____

DESIGN STRUCTURE MEASURE

Form Code: MaIMM.1

LIFE CYCLE PHASE:

IMPLEMENTATION

SOURCE(S):

☐ SYSTEM

NAME: _____

☐ SUBSYSTEM

☐ MODULE

I. DATA COLLECTION WORKSECTION:

SCORE

1.0 Entrance and Exit of the Module (83)

1.1 Number of entrances into modules. ☐

1.2 Number of exits from module. ☐

$$\text{Score} = \frac{1}{1.1} + \frac{1}{1.2}$$

II. METRIC WORKSECTION:

Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the data elements above?
(1-10) _____ (# If you are unable to evaluate)

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

COMPLEXITY MEASURE		
		Form Code: <u>MaIMM.2</u>
LIFE CYCLE PHASE: IMPLEMENTATION		SOURCE(S): _____
☐ SYSTEM ☐ SUBSYSTEM ☐ MODULE	NAME: _____ _____ _____	_____ _____
I. <u>DATA COLLECTION WORKSECTION:</u> 1.0 <u>Data and Control Flow Complexity (81)</u> 1.1 What is the sum of the number of decision points, subdecision points, conditional branches and unconditional branches? ☐ Score = $1 \div (\boxed{1.1} + 1)$		SCORE
II. <u>METRIC WORKSECTION:</u> Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$		
III. <u>EVALUATION WORKSECTION:</u> What is your evaluation of the reviewed products based on the data elements above? (1-10) _____ (Ø If you are unable to evaluate)		
IV. <u>INSPECTOR'S COMMENTS:</u> 		

PREPARED BY: _____ APPROVED BY: _____
 DATE: _____ DATE: _____

CODING SIMPLICITY MEASURE

Form Code: MaIMM.3

LIFE CYCLE PHASE:
IMPLEMENTATION

SOURCE(S):
Source Code

- ☐ SYSTEM
☐ SUBSYSTEM
☐ MODULE

NAME: _____

I. DATA COLLECTION WORKSECTION:

SCORE

1.0 Negative Boolean or Compound Boolean Expressions (106)

1.1 Number of negative or complicated compound Boolean expressions. ☐

1.2 Number of lines excluding comments. ☐

$$\text{Score} = 1 - \left(\frac{1.1}{1.2} \right)$$

☐

2.0 Statement Labels (108)

2.1 Number of statement labels?
(Do not count format statements) ☐

2.2 Number of lines excluding comments
(Executable statements) ☐

$$\text{Score} = 1 - \left(\frac{2.1}{2.2} \right)$$

☐

3.0 Nesting Level (109)

3.1 Maximum nesting level? ☐

$$\text{Score} = \frac{1}{3.1}$$

☐

4.0 Conditional Branches (110)

4.1 Number of conditional branches? ☐

4.2 Number of executable statements? ☐

$$\text{Score} = 1 - \left(\frac{4.1}{4.2} \right)$$

☐

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

CODING SIMPLICITY MEASURE

Form Code: Ma. IMM. 3

LIFE CYCLE PHASE:

IMPLEMENTATION

- ☐ SYSTEM
☐ SUBSYSTEM
☐ MODULE

NAME: _____

SOURCE(S):

I. DATA COLLECTION WORKSECTION (continued):

SCORE

5.0 Unconditional Branches (111)

5.1 Number of unconditional branches. ☐

5.2 Number of executable statements. ☐

$$\text{Score} = 1 - (\boxed{5.1} + \boxed{5.2})$$

☐

6.0 In and Out of Loops (112)

6.1 Number of one entrance/
one exit loops. ☐

6.2 Total Number of loops. ☐

$$\text{Score} = \boxed{6.1} + \boxed{6.2}$$

☐

7.0 Loop Index (113)

7.1 Number of loop indices that are
modified. ☐

7.2 Total number of loops. ☐

$$\text{Score} = 1 - (\boxed{7.1} + \boxed{7.2})$$

☐

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

CODING SIMPLICITY MEASURE

Form Code: MaDM.3

LIFE CYCLE PHASE:

IMPLEMENTATION

SOURCE(S):

SOURCE CODE

- ☐ SYSTEM
☐ SUBSYSTEM
☐ MODULE

NAME: _____

I. DATA COLLECTION WORKSECTION (continued):

SCORE

8.0 Module Flow Top to Bottom (115)

8.1 Is flow top to bottom?
 There should not be any backward
 branching GOTOs.)

Yes = 1, No = 0

☐ Y ☐ N

☐

9.0 Local Variables (128)

9.1 Number of local variables.

☐

9.2 Number of variables (local and global).

☐

Score = ☐ 9.1 + ☐ 9.2

☐

II. METRIC WORKSECTION:

Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the
 reviewed products based on the data elements above?
 (1-10) _____ (0 If you are unable to evaluate)

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

MODULAR IMPLEMENTATION MEASURE

Form Code: MaIMM.4

LIFE CYCLE PHASE:

IMPLEMENTATION

SOURCE(S):

☐ SYSTEM

NAME: _____

☐ SUBSYSTEM

☐ MODULE

I. DATA COLLECTION WORKSECTION:

SCORE

1.0 Controlling Parameters (87)

1.1 Number of calling sequence parameters that are control variables. ☐

1.2 Number of calling sequence parameters. ☐

Score = ☐ 1.1 - ☐ 1.2

2.0 Controlling Input (88)

2.1 Is input passed as calling sequence parameters? ☐ Y ☐ N

Yes = 1, No = 0

3.0 Controlling Output (89)

3.1 Is output data passed back to calling module? ☐ Y ☐ N

Yes = 1, No = 0

4.0 Controlling Return (90)

4.1 Is control returned to calling module? ☐ Y ☐ N

Yes = 1, No = 0

II. METRIC WORKSECTION:

Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the data elements above?
(1-10) _____ (§ If you are unable to evaluate)

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

QUANTITY OF COMMENTS MEASURE

Form Code: MaIMM.5

LIFE CYCLE PHASE:

IMPLEMENTATION

SOURCE(S):

☐

SYSTEM

NAME: _____

☐

SUBSYSTEM

☐

MODULE

I. DATA COLLECTION WORKSECTION:

SCORE

1.0 Quantity of Comments (117)

1.1 Number of non-blank lines of comments. ☐

1.2 Number of non-blank lines. ☐

Score = $\frac{1.1}{1.2}$

II. METRIC WORKSECTION:

Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the data elements above?
(1-10) _____ (§ If you are unable to evaluate)

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

EFFECTIVENESS OF COMMENTS MEASURE

Form Code: MaIMM.6

LIFE CYCLE PHASE:
IMPLEMENTATION

SOURCE(S):

- ☐ SYSTEM
☐ SUBSYSTEM
☐ MODULE

NAME: _____

I. DATA COLLECTION WORKSECTION:

SCORE

1.0 Prologue Comments (118)

1.1 Are there prologue comments containing information about the function, author, version number, data inputs, outputs, assumptions and limitations? ☐ Y ☐ N

Yes = 1, No = 0

☐

2.0 Control and Destinations Comment (119)

2.1 How many decision points and transfers of control are not commented? ☐

2.2 Total number of decision points. ☐

Score = 1 - (☐ 2.1 : ☐ 2.2)

☐

3.0 Machine Dependent Code Comment (120)

3.1 Is all machine language code commented? ☐ Y ☐ N

Yes = 1, No = 0

☐

4.0 Non-standard HOL Statements Comment (121)

4.1 Are non-standard HOL statements commented? ☐ Y ☐ N

Yes = 1, No = 0

☐

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

EFFECTIVENESS OF COMMENTS MEASURE (Continued)

Form Code: MaIMM.6

LIFE CYCLE PHASE:
IMPLEMENTATION

SOURCE(S):

- ☐ SYSTEM
☐ SUBSYSTEM
☐ MODULE

NAME: _____

I. DATA COLLECTION WORKSECTION (continued):

SCORE

5.0 Declared Variables Commented (122)

5.1 How many declared variables are not described by comments? ☐

5.2 Number of variables. ☐

Score = 1 - (☐ 5.1 ÷ ☐ 5.2)

☐

6.0 Comments Which Do Not Only Repeat the Operation (124)

6.1 Do the comments do more than repeat the operation? ☐ Y ☐ N

Yes = 1, No = 0

☐

7.0 Identification of Comments (137)

7.1 Are comments set off from the code in a uniform manner? ☐ Y ☐ N

Yes = 1, No = 0

☐

II. METRIC WORKSECTION:

Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the data elements above? (1-10) _____ (# If you are unable to evaluate)

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

DESCRIPTIVENESS OF IMPLEMENTATION LANGUAGE MEASURE

Form Code: MaIMM.7

LIFE CYCLE PHASE: IMPLEMENTATION		SOURCE(S): _____ _____ _____
☐ SYSTEM	NAME: _____	
☐ SUBSYSTEM	_____	
☐ MODULE	_____	

I. DATA COLLECTION WORKSECTION:	SCORE
1.0 <u>High Order Language</u> (107) 1.1 Is high order language used? YN If Yes = 1, No = 0	☐
2.0 <u>Variable Names</u> (123) 2.1 Are variable name (mnemonics) descriptive of the physical or functional property they represent? YN If Yes = 1, No = 0	☐
3.0 <u>Blocked and Indented Source Code</u> (125) 3.1 Is the code logically blocked and indented? YN If Yes = 1, No = 0	☐

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

DESCRIPTIVENESS OF IMPLEMENTATION LANGUAGE MEASURE (Continued)

Form Code: MaIMM.7

LIFE CYCLE PHASE:

IMPLEMENTATION

SOURCE(S):

- ☐ **SYSTEM**
☐ **SUBSYSTEM**
☐ **MODULE**

NAME: _____

I. DATA COLLECTION WORKSECTION (continued):

SCORE

4.0 One Statement Per Line (126)

4.1 Number of lines with more than one statement.

☐

4.2 Number of contiguous lines.

☐

4.3 The total number of lines in a module.

☐

$$\text{Score} = 1 - \left(\frac{\boxed{4.1} + \boxed{4.2}}{\boxed{4.3}} \right)$$

☐

II. METRIC WORKSECTION:

Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$

☐

**III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the data elements above?
 (1-10) _____ (0 If you are unable to evaluate)**

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ **APPROVED BY:** _____

DATE: _____ **DATE:** _____

<u>SIMPLICITY</u>			Form Code: <u>MaIMC.1</u>
LIFE CYCLE PHASE: IMPLEMENTATION		SOURCE(S): MaIMM.1MaIMM.2	
☐ SYSTEM ☐ SUBSYSTEM ☐ MODULE	NAME: _____ _____ _____	_____ MaIMM.3 _____	
I. <u>METRIC SUMMARY WORKSECTION:</u> 1. Design Structure Measure 2. Complexity Measure 3. Coding Simplicity Measure			SCORE
II. <u>CRITERIA WORKSECTION:</u> $\text{Criteria Value} = \frac{\text{Sum of Above Scores}}{\text{No. of Metrics}}$			
III. <u>EVALUATION WORKSECTION:</u> What is your evaluation of the reviewed products based on the metrics above? (1-10) _____ (§ If you are unable to evaluate)			

PREPARED BY: _____ APPROVED BY: _____
 DATE: _____ DATE: _____

MODULARITY

Form Code: MaIMC.2

LIFE CYCLE PHASE:

IMPLEMENTATION

SOURCE(S):

MaIMM.4

☐

SYSTEM

NAME: _____

☐

SUBSYSTEM

☐

MODULE

I. METRIC SUMMARY WORKSECTION:

1. Modular Implementation Measure

SCORE

☐

II. CRITERIA WORKSECTION:

Criteria Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Metrics}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the metrics above?
(1-10) _____ (§ If you are unable to evaluate)

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

SELF-DESCRIPTIVENESS

Form Code: MaIMC.3

LIFE CYCLE PHASE: IMPLEMENTATION		SOURCE(S): MaIMM.5 MaIMM.6 MaIMM.7	
☐ SYSTEM	NAME: _____		
☐ SUBSYSTEM	_____		
☐ MODULE	_____		

I. <u>METRIC SUMMARY WORKSECTION:</u>		SCORE
1. Quantity of comments measure		☐
2. Effectiveness of comments measure		☐
3. Descriptiveness of implementation language measure		☐
II. <u>CRITERIA WORKSECTION:</u>		
Criteria Value $\frac{\text{Sum of Above Scores}}{\text{No. of Metrics}}$		☐
III. <u>EVALUATION WORKSECTION:</u> What is your evaluation of the reviewed products based on the metrics above? (1-10) _____ (Ø If you are unable to evaluate)		

PREPARED BY: _____ APPROVED BY: _____
DATE: _____ DATE: _____

<u>MAINTAINABILITY</u>		
		Form Code: <u>MaIMF.1</u>
LIFE CYCLE PHASE: IMPLEMENTATION		SOURCE(S): MaIMC.1 MaIMC.2
☐ SYSTEM ☐ SUBSYSTEM ☐ MODULE	NAME: _____ _____ _____	_____ MaIMC.3 _____
I. <u>CRITERIA SUMMARY WORKSECTION:</u> 1. Simplicity 2. Modularity 3. Self-Descriptiveness		SCORE ☐ ☐ ☐
II. <u>FACTOR WORKSECTION:</u> Factor Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Criteria}}$		☐
III. <u>EVALUATION WORKSECTION:</u> What is your evaluation of the reviewed products based on the criteria above? (1-10) _____ (§ If you are unable to evaluate)		

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

MAINTAINABILITY

Complete this score chart if application of this set of worksheets is appropriate when products of A and B in Coding and Checkout Phase are available.

<u>Data Element Number</u>	<u>Answer of Data Element</u>	<u>Data Element Score</u>	<u>Metric Score</u>	<u>Criteria Score</u>	<u>Factor Score</u>
<u>83</u>					
<u>81</u>					
<u>106</u>					
<u>108</u>					
<u>109</u>					
<u>110</u>					
<u>111</u>					
<u>112</u>					
<u>113</u>					
<u>115</u>					
<u>128</u>					
<u>87</u>					
<u>88</u>					
<u>89</u>					
<u>90</u>					

MAINTAINABILITY

<u>Data Element Number</u>	<u>Answer of Data Element</u>	<u>Data Element Score</u>	<u>Metric Score</u>	<u>Criteria Score</u>	<u>Factor Score</u>
<u>117</u>					
<u>118</u>					
<u>119</u>					
<u>120</u>					
<u>121</u>					
<u>122</u>					
<u>124</u>					
<u>137</u>					
<u>107</u>					
<u>123</u>					
<u>125</u>					
<u>126</u>					

(from previous page)

FIRST MEASUREMENT

Date _____

MAINTAINABILITY

Complete this score chart if application of this set of worksheets is appropriate for update when products of B-D2 in Test and Integration Phase is available.

<u>Data Element Number</u>	<u>Answer of Data Element</u>	<u>Data Element Score</u>	<u>Metric Score</u>	<u>Criteria Score</u>	<u>Factor Score</u>
<u>83</u>					
<u>81</u>					
<u>106</u>					
<u>108</u>					
<u>109</u>					
<u>110</u>					
<u>111</u>					
<u>112</u>					
<u>113</u>					
<u>115</u>					
<u>128</u>					
<u>87</u>					
<u>88</u>					
<u>89</u>					
<u>90</u>					

MAINTAINABILITY

<u>Data Element Number</u>	<u>Answer of Data Element</u>	<u>Data Element Score</u>	<u>Metric Score</u>	<u>Criteria Score</u>	<u>Factor Score</u>
<u>117</u>					
<u>118</u>					
<u>119</u>					
<u>120</u>					
<u>121</u>					
<u>122</u>					
<u>124</u>					
<u>137</u>					
<u>107</u>					
<u>123</u>					
<u>125</u>					
<u>126</u>					

(from previous page)

SECOND MEASUREMENT

Date _____

MAINTAINABILITY

Complete this score chart if application of this set of worksheets is appropriate for update when products of B-D2 in Test and Integration Phase is available.

<u>Data Element Number</u>	<u>Answer of Data Element</u>	<u>Data Element Score</u>	<u>Metric Score</u>	<u>Criteria Score</u>	<u>Factor Score</u>
<u>83</u>					
<u>81</u>					
<u>106</u>					
<u>108</u>					
<u>109</u>					
<u>110</u>					
<u>111</u>					
<u>112</u>					
<u>113</u>					
<u>115</u>					
<u>128</u>					
<u>87</u>					
<u>88</u>					
<u>89</u>					
<u>90</u>					

MAINTAINABILITY

<u>Data Element Number</u>	<u>Answer of Data Element</u>	<u>Data Element Score</u>	<u>Metric Score</u>	<u>Criteria Score</u>	<u>Factor Score</u>
<u>117</u>					
<u>118</u>					
<u>119</u>					
<u>120</u>					
<u>121</u>					
<u>122</u>					
<u>124</u>					
<u>137</u>					
<u>107</u>					
<u>123</u>					
<u>125</u>					
<u>126</u>					

(from previous page)

THIRD MEASUREMENT

Date _____

QUALITY FACTOR

MODULE NO. 7

FLEXIBILITY

TABLE OF CONTENTS

<u>TITLE</u>	<u>PAGE</u>
<u>INTRODUCTION AND INSTRUCTIONS FOR FLEXIBILITY MODULE</u>	
INTRODUCTION TO FLEXIBILITY.	Fx-1
STEPS FOR COMPLETING WORKSHEETS	Fx-4
STEPS FOR UPDATE APPLICATIONS	Fx-7
HOW TO USE SCORE CHART SETS	Fx-8
ESD PRODUCTS FOR ANALYSIS PHASE	Fx-11
ESD PRODUCTS FOR DESIGN PHASE	Fx-12
ESD PRODUCTS FOR CODING AND CHECKING PHASE. .	Fx-13
ESD PRODUCTS FOR TEST AND INTEGRATION PHASE .	Fx-14
 <u>QUALITY FACTOR NO. 7 FLEXIBILITY WORKSHEETS</u>	
WORKSHEETS FOR DETAIL DESIGN PHASE	Fx-15
WORKSHEETS FOR IMPLEMENTATION PHASE.	Fx-27

This QUALITY FACTOR MODULE is one of a set of eleven modules that are components of the "COMPUTER SYSTEMS ACQUISITION METRICS HANDBOOK".

INTRODUCTION AND INSTRUCTIONS
FOR
FLEXIBILITY MODULE

INTRODUCTION TO FLEXIBILITY

The Quality Factor Flexibility represents a measure of the effort required to modify an operational program. FIGURES Fx - 1 through Fx - 4 represent the hierarchy of Metric, Criteria and Quality Factor worksheets associated with Flexibility in Requirements Analysis, Preliminary Design, Detailed Design and Implementation phases of the Software Development Life Cycle.

The worksheets in this module are grouped into four separate sets, one set for each Life Cycle phase. Each set consists of Metric worksheets, Criteria worksheets, a Factor worksheet and score charts.

METRIC WORKSHEETS

One or more DATA COLLECTION WORKSECTIONS which contain the data element scores for each Metric, and each Metric's Final Score.

CRITERIA WORKSHEETS

One or more METRIC SUMMARY WORKSECTIONS which contain the Metrics scores for each Criteria, and each Criteria's Final Score.

FACTOR WORKSHEETS

One CRITERIA SUMMARY WORKSECTION which contains each Criteria's score, and the Final Score for the Factor for that phase.

SCORE CHARTS:

One or more charts that record worksheet values throughout the Life Cycle.

However, the sequence in which the worksheet sets are applied is dependent on the availability of ESD Computer Program Life Cycle products. Usually the worksheets will be applied sequentially, except for updates.

These instructions show when the Flexibility worksheet sets and Score Charts are applied during the Computer Program Life Cycle. The Product Code referred to on the Score Charts is the code defined in the ESD Guidebook Series, Software Acquisition Management Guidebook, Life Cycle Events and reillustrated in the General Instructions. The Product Tables map the ESD Computer Program Life Cycle Products to the Metric Worksheets. The balance of these instructions are step-by-step procedures for completing the worksheets and score chart summaries.

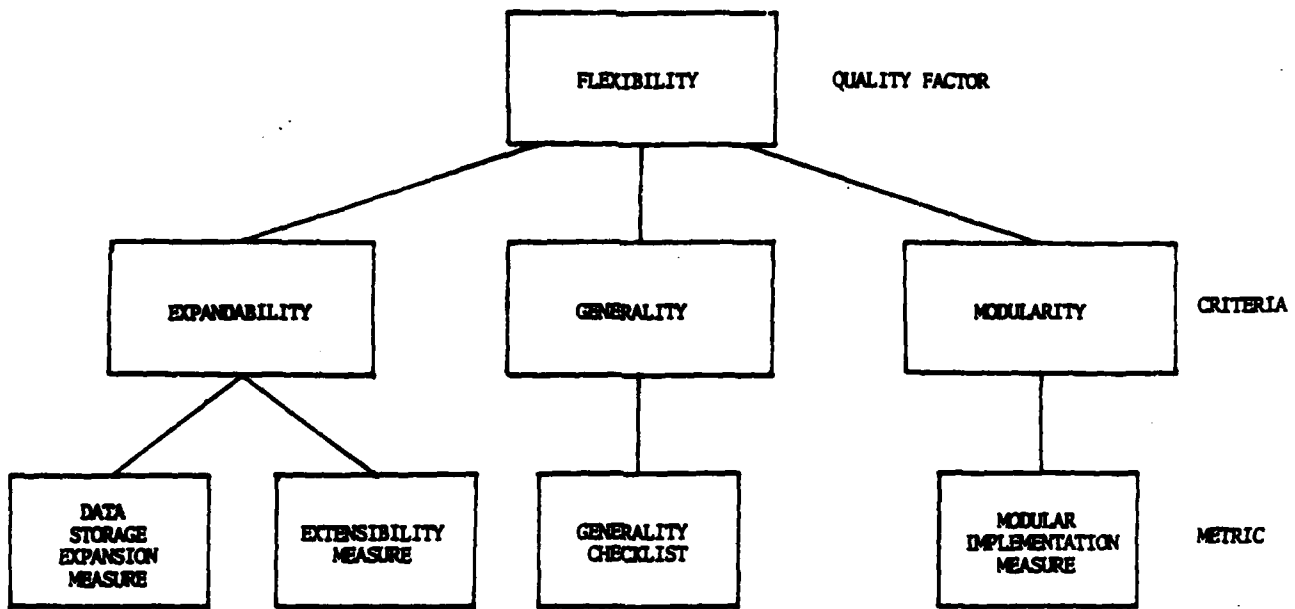


FIGURE Fx-1
DETAILED DESIGN WORKSHEET HIERARCHY

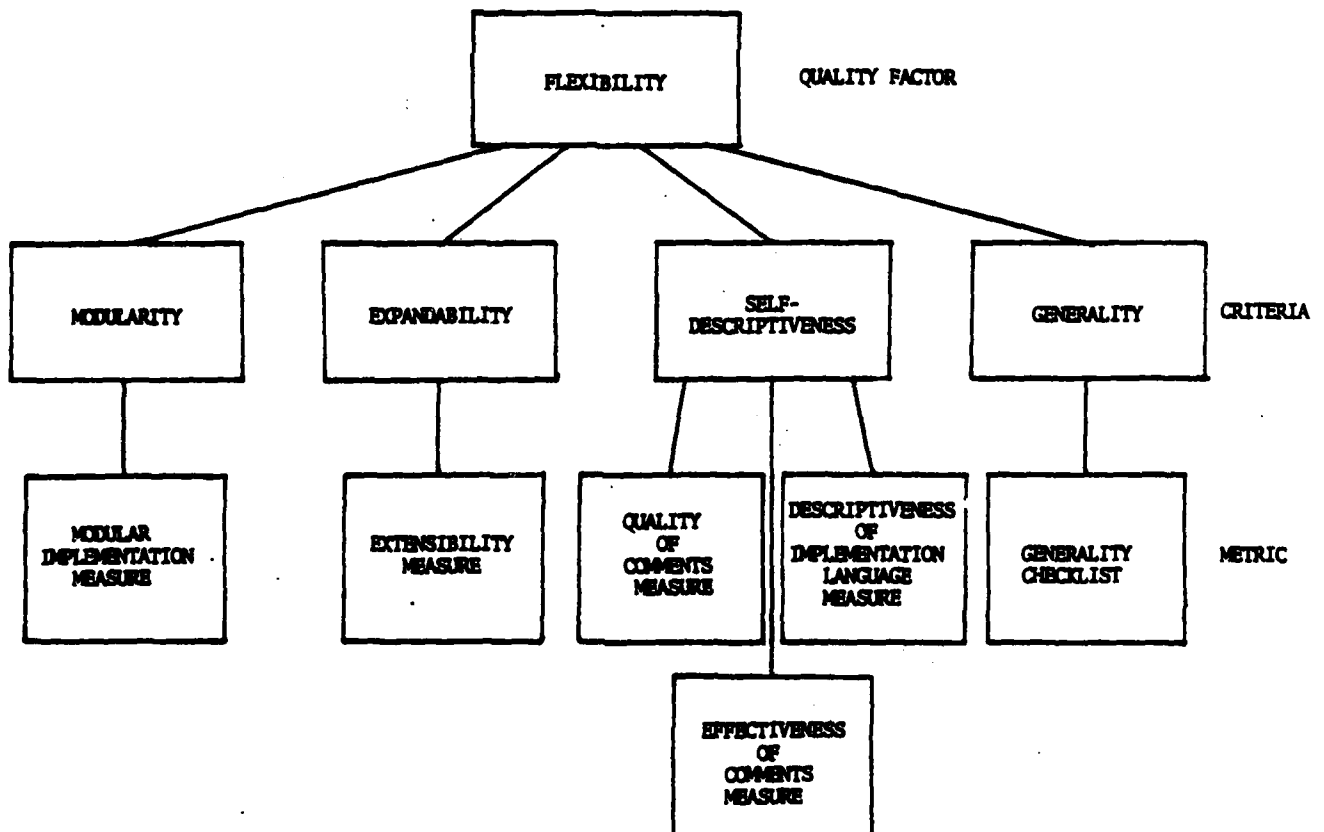


FIGURE Fx-2
IMPLEMENTATION WORKSHEET HIERARCHY

STEPS FOR COMPLETING WORKSHEETS

Step 1

Enter the appropriate information in the following blocks:

- (1.1) SYSTEM/SUBSYSTEM/MODULE block-Indicate the level of application.
- (1.2) NAME block-List the name of the system being measured.
- (1.3) SOURCE block-On Metric Worksheets, list the source document.
- (1.4) The PREPARED BY and DATE blocks should contain the name of the person performing the software metrics, and the current date.

Step 2

Determine the current Computer Program Life Cycle Phase. This module is concerned with four phases of the Computer Program Life Cycle:

- (2.1) Requirements Analysis
- (2.2) Preliminary Design
- (2.3) Detail Design
- (2.4) Implementation

Step 3

Determine the available products from the phase and which data worksheet set to apply. Each Life Cycle phase has at least three different activities associated with it. The result of the completion of an activity is one or more documents called products.

Before a worksheet set can be applied, specific products associated with it must be obtained. The Product Tables, at the end of the instructions, detail the products required for each worksheet set.

Step 4 - METRIC WORKSHEETS

- (4.1) Answer each question in the Data Collection Worksection as it applies to the system/subsystem/module you are measuring and transfer its scored value to its corresponding SCORE block.

If the question calls for a YES/NO type response, a YES answer is scored at a 1.
a NO answer is scored as a 0.

The questions that call for a numeric quantity type response have specific instructions on how to score the response. Follow the instructions under each data element.

- (4.2) Find the Metric Value by following the algorithm on the worksheet.
- (4.3) Answer the Evaluation Worksection - evaluate the products based on the data elements as they apply to the system.
- (4.4) When you have repeated this procedure for all the Metric Worksheets in the set, you are ready to use the Criteria Worksheets.

Step 5 - CRITERIA WORKSHEETS

- (5.1) Each numbered item in the Metric Summary Worksection represents an individual Metric Value.

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COMPUTER SYSTEMS ACQUISITION METRICS HANDBOOK. VOLUME II. QUALI--ETC(U)

MAY 82

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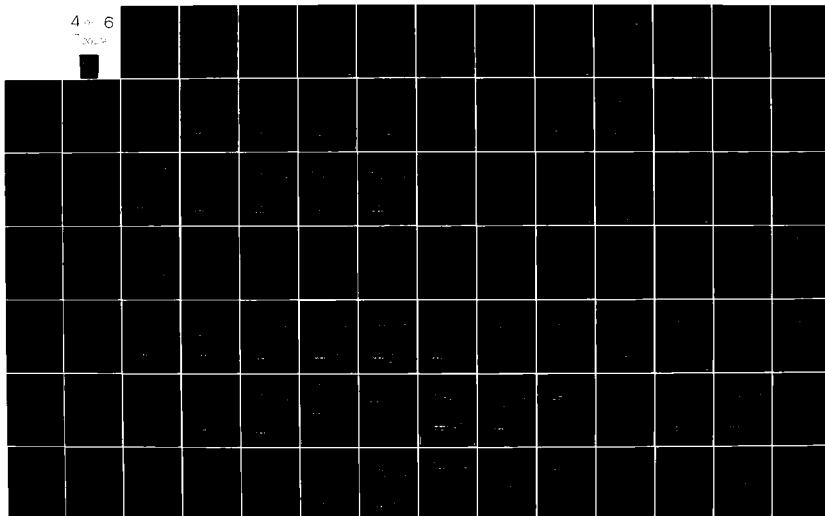
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- (5.2) Find the Form Code in the SOURCE box of the Criteria Worksheet.
- (5.3) Find the Metric Worksheet with the same Form Code and transfer its Metric Value into the box to the right of the item in the Criteria Worksheet.
- (5.4) Repeat this process for all items in the Metric Summary Worksection.
- (5.5) Find the Criteria Value by following the algorithm on the worksheet.
- (5.6) Answer the Evaluation Worksection - evaluate the products based on the Metrics as they apply to the system.

Step 6 - FACTOR WORKSHEETS

- (6.1) Each numbered item in the Criteria Summary Worksection represents an individual Criterion Value.
- (6.2) Find the Form Code in the SOURCE box of the Factor Worksheet.
- (6.3) Find the Criteria Worksheet with the same Form Code and transfer its Criteria Value into the box in the Score column in the Factor Worksheet.
- (6.4) Repeat this process for all items in the Criteria Summary Worksection.
- (6.5) Answer the Evaluation Worksection - evaluate the products based on the Criteria as they apply to the system.
- (6.6) Find the Factor Value by following the algorithm on the Worksheet.

STEPS FOR UPDATE APPLICATIONS

Step 1

Determine the update necessary. The Product Tables at the end of these instructions list the updates required and the activities and products associated with each update. Also review Section 2.3.2, "Update Information Requirements", in the General Instructions Handbook for further information if necessary.

Step 2

Obtain the required products. The Products Tables at the end of these Instructions list the products required for each update application.

Step 3

Reapply the Metric, Criteria, and Factor worksheets by following the procedure already outlined in "Steps for Completing Worksheets", of these Instructions. "How to Use Score Chart sets", explains the procedure for reporting the update scores.

HOW TO USE SCORE CHART SETS

When you apply worksheets to system/subsystem/module, you must apply some worksheets more than once in the Computer Program Life Cycle. Because of this, a Score Chart set is organized so that the groups of worksheet scores, acquired at the times a set of worksheets is applied, can be recorded separately: originals & updates.

The Score Chart set (at the end of each worksheet set) is composed of similar tree structure diagrams. Each Score Chart represents the complete hierarchy of scores to be acquired during any one application of worksheets sets in the Life Cycle.

When applying any worksheet, in order to record scores you must locate and use the Score Chart that corresponds to the current phase in the Life Cycle. In a Score Chart set, the first Score Chart (labeled FIRST MEASUREMENT) is designed to receive the scores from the first application of a worksheet set in the Life Cycle, and the following charts (i.e., labeled SECOND MEASUREMENT, etc.) are designed to receive the scores from the updates.

Each data element in the Metrics Worksheet has a unique number in the Data Element Dictionary, which is listed in the first column in the Score Chart. The next two columns of boxes in a Score Chart show a worksheet set's individual data element raw scores and its interpreted response (Yes/No, = 1 or 0, etc.). The last three box columns map out the Metric, Criteria and Factor worksheets of a set, each box representing the total score of a corresponding worksheet.

Once you have finished scoring a Worksheet set and located the corresponding Score Chart set, use the following procedure for filling out the Score Chart:

Step 1 - ANSWER OF DATA ELEMENT/DATA ELEMENT SCORE

For each data element in a Metric Worksheet:

- (1.1) Reference its number in the "Data Element Number" Column in the Score Chart.
- (1.2) Transfer the answers you gave to the questions in the Data Collection Worksection to the corresponding box under the column headed "Answer of Data Element"
- (1.3) Transfer the Scores of the data element from the Data Collection Worksection to its corresponding box under column labeled "Data Element Score".
- (1.4) Repeat this step for all data elements within this phase.

Step 2 - METRIC SCORE

Each box in this column represents the Score from the Metric Worksection of a Metric Worksheet. Transfer the Metric Value from each Metric Worksheet into the corresponding boxes in the Score Chart's Metric Score Column.

Step 3 - CRITERIA SCORE

Each box in this column represents the score from the Criteria Worksection of a Criteria Worksheet into the corresponding boxes of the Score Chart's Criteria Score Column.

Step 4 - FACTOR SCORE

Each box in this column represents the score from the Factor Worksection of a Quality Factor Worksheet. Transfer the Factor from the set's Factor Worksheet into corresponding boxes of the Score Chart's Factor Score Column.

These Score Chart sets will provide a historical base for repeated application of the metrics to a system at all levels. They are also a useful means of reporting your finds to the program manager in a condensed and compact form.

PRODUCTS	TRADE-OFF STUDY REPORTS	INITIAL OR AUTHENTICATED SYSTEM SPEC, SEGMENT SPEC	AUTHENTICATED DEVELOPMENT SPEC FOR CPCI	HIGHER LEVEL SPEC	DRAFT PRODUCT SPECS	PDR MINUTES AND ACTION ITEM RESPONSES
WORKSHEET SET TO BE APPLIED	REQUIREMENTS ANALYSIS WORKSHEETS				PRELIMINARY DESIGN WORKSHEETS	

ESD PRODUCTS FOR ANALYSIS PHASE

Apply the Requirement Analysis Worksheets as the following types of products become available. See note below.

- Product A.1 - Trade-off Study Reports
- Product A.2 - Initial or Authenticated System Specification & Segment Specification (if any)
- Product B.1 - Authenticated Development Specification for each CPCI
- Product B.2 - Possible higher-level specification, ICD and changes

Apply the Preliminary Design Worksheets as the following types of products become available. See note below.

- Product B.3 - Parts of draft Product Specifications containing design approaches for each CPCI
- Product C. - PDR minutes and action item responses

NOTE: If these products do not contain the information requested by the Data Element questions, other contractor-supplied information should be searched.

PRODUCTS	FUNCTIONAL FLOW CHARTS	DE- TAILED FLOW CHART	DATA FORMAT DESC.	ALGO- RITHM DESC.	PRELIMI- NARY PRODUCT DESC.	CDR MINUTES ACTION ITEM RESPON- SES	SYSTEM SEG- MENT TEST PLANS	PRELIM. CPCI TEST PRO- CEDURES
WORKSHEET SET TO BE APPLIED	DETAILED DESIGN WORKSHEETS						PRELIMINARY DESIGN WORKSHEETS, (UPDATE)	

ESD PRODUCTS FOR DESIGN PHASE

Apply the Detailed Design Worksheets as the following types of products become available. See note below.

- Product A.1: Functional flowcharts
- Product A.2: Detailed flowcharts
- Product A.3: Data format descriptions
- Product A.4: Descriptions of algorithms not previously prescribed
- Product B. : Preliminary Product Specifications, including the above
- Product D. : CDR minutes & action item responses

Apply the Preliminary Design Worksheets for Update as the following types of products become available. See note.

- Product C.1: System, Segment and CPCI Test Plans
- Product C.2: Preliminary CPCI Test Procedures

NOTE: If these products do not contain the information requested by the Data Element questions, other contractor-supplied information should be searched.

PRODUCTS	CODE	ALTERED PRODUCT SPECS
WORKSHEET SET TO BE APPLIED	IMPLEMENTATION WORKSHEETS	DETAILED DESIGN WORKSHEETS (UPDATE)

ESD PRODUCTS FOR CODING AND CHECKING PHASE

Apply the Implementation Worksheets as the code becomes available.

Apply the Detailed Design Worksheets for Update as the following types of products become available. See note below.

- Product C. - Altered Product Specifications, including compiler/assembly listings.

NOTE: If these products do not contain the information requested by the Data Element questions, other contractor-supplied information should be searched.

PRODUCTS	FINAL CPCI TEST PROCEDURES	SEGMENT 4 SYSTEM LEVEL TEST PROCEDURES	TEST REPORTS	CODING CHANGES	MODIFIED PRODUCT SPECS	HIGH LEVEL SPECS
WORKSHEET SET TO BE APPLIED	PRELIMINARY DESIGN WORKSHEETS			IMPLEMEN- TATION WORKSHEETS	DETAILED DESIGN WORKSHEETS (UPDATE)	

ESD PRODUCTS FOR TEST AND
INTEGRATION PHASE

Apply the Preliminary Design Worksheets for Update as the following types of products become available. See note below.

- ^A Product 1: Final CPCI Test Procedures
- Product 2: Segment (if any) and system-level Test Procedures

- ^{B-D} Product 1: Test Reports

Apply the Implementation Worksheets for Update as the following types of products become available. See note below.

- ^{B-D} Product 2: Computer Program Coding Changes

Apply the Detailed Design Worksheets for Update as the following types of products become available. See note.

- ^{B-D} Product 3: Modified Product Specification
- Product 4: Possible high-level specification, ICD and changes.

NOTE: If these products do not contain the information requested by the Data Element questions, other contractor-supplied information should be searched.

DATA STORAGE EXPANSION MEASURE

Form Code: FxDDM.1

LIFE CYCLE PHASE:

DETAIL DESIGN

- ☐ SYSTEM
☐ SUBSYSTEM
☐ MODULE

NAME: _____

SOURCE(S):

I. DATA COLLECTION WORKSECTION:

SCORE

1.0 Logical Processing Independence (98)

1.1 Is logical processing independent
 of storage specification?

☐ Y ☐ N

Yes = 1, No = 0

*Score of the System = $\frac{\text{No. of Modules with "YES"}}{\text{Total No. of Modules}}$

☐

II. METRIC WORKSECTION:

Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the
 reviewed products based on the data elements above?
 (1-10) _____ (§ If you are unable to evaluate)

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

EXTENSIBILITY MEASURE
(By Module)

Form Code: FxDDM. 2

LIFE CYCLE PHASE:

DETAIL DESIGN

SOURCE(S):

- ☐ SYSTEM
☐ SUBSYSTEM
☐ MODULE

NAME: _____

I. DATA COLLECTION WORKSECTION:

SCORE

1.0 Modules Table Driven (99)

1.1 Is the module table driven?

☐ Y ☐ N

Yes = 1, No = 0

*Score of the System = $\frac{\text{No. of Modules with "YES"}}{\text{Total No. of Modules}}$

2.0 Accuracy, Convergence and Timings Attributes (84)

2.1 Are accuracy, convergence, or timing attributes parametric?

☐ Y ☐ N

II. METRIC WORKSECTION:

Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the data elements above?
(1-10) _____ (§ If you are unable to evaluate)

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

MODULAR IMPLEMENTATION MEASURE

Form Code: FxDDM.3

LIFE CYCLE PHASE:

DETAIL DESIGN

SOURCE(S):

☐ SYSTEM

NAME: _____

☐ SUBSYSTEM

☐ MODULE

I. DATA COLLECTION WORKSECTION:

SCORE

1.0 Controlling Parameters (87)

1.1 Number of calling sequence parameters that are control parameters. ☐

1.2 Number of calling sequence parameters. ☐

Score = ☐ 1.1 + ☐ 1.2

2.0 Controlling Input (88)

2.1 Is input passed as calling sequence parameters? ☐ Y ☐ N

Yes = 1, No = 0

3.0 Controlling Output (89)

3.1 Is output data passed back to calling module? ☐ Y ☐ N

Yes = 1, No = 0

4.0 Controlling Return (90)

4.1 Is control returned to calling module? ☐ Y ☐ N

Yes = 1, No = 0

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

MODULAR IMPLEMENTATION MEASURE (Continued)

Form Code: FxDDM.3

LIFE CYCLE PHASE: DETAIL DESIGN		SOURCE(S): 	
☐ SYSTEM ☐ SUBSYSTEM ☐ MODULE	NAME: _____ _____ _____		

I. <u>DATA COLLECTION WORKSECTION (continued):</u> 5.0 Share Temporary Storage (91) 5.1 Is temporary storage independent of other modules? Yes = 1, No = 0	SCORE
II. <u>METRIC WORKSECTION:</u> Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$	
III. <u>EVALUATION WORKSECTION:</u> What is your evaluation of the reviewed products based on the data elements above? (1-10) _____ (Ø If you are unable to evaluate)	
IV. <u>INSPECTOR'S COMMENTS:</u> 	

PREPARED BY: _____ APPROVED BY: _____
 DATE: _____ DATE: _____

GENERALITY CHECKLIST

Form Code: FxDDM.4

LIFE CYCLE PHASE:

DETAIL DESIGN

SOURCE(S):

☐ SYSTEM

NAME: _____

☐ SUBSYSTEM

☐ MODULE

I. DATA COLLECTION WORKSECTION:

SCORE

1.0 Unmixed Processing and Input/Output (92)

1.1 Does the module not mix input, output, and processing functions in the same module?

☐ Y ☐ N

Yes = 1, No = 0

2.0 Machine Dependent Functions(93)

2.1 Number of machine dependent functions performed.

Score = 1 + 2.1

3.0 Unlimited Data Volume (94)

3.1 Is processing data volume unlimited?

☐ Y ☐ N

Yes = 1, No = 0

4.0 Unlimited Data Value (95)

4.1 In the Design Phase, is processing data value unlimited?

☐ Y ☐ N

Yes = 1, No = 0

II. METRIC WORKSECTION:

Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the data elements above?
(1-10) _____ (§ If you are unable to evaluate)

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

EXPANDABILITY

Form Code: FxDDC.1

LIFE CYCLE PHASE:

DETAIL DESIGN

SOURCE(S):

FxDDM.1

FxDDM.2

☐ **SYSTEM**

NAME: _____

☐ **SUBSYSTEM**

☐ **MODULE**

I. METRIC SUMMARY WORKSECTION:

1. Data Storage Expansion Measure

2. Extensibility Measure

SCORE

☐☐

II. CRITERIA WORKSECTION:

Criteria Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Metrics}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the metrics above?
(1-10) _____ (Ø If you are unable to evaluate)

PREPARED BY: _____ **APPROVED BY:** _____

DATE: _____ **DATE:** _____

MODULARITY

Form Code: FxDDC.2

LIFE CYCLE PHASE:

DETAIL DESIGN

SOURCE(S):

FxDDM.3

☐ SYSTEM

NAME: _____

☐ SUBSYSTEM

☐ MODULE

I. METRIC SUMMARY WORKSECTION:

1. Modular Implementation Measure

SCORE

☐

II. CRITERIA WORKSECTION:

Criteria Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Metrics}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the metrics above?
(1-10) _____ (# If you are unable to evaluate)

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

GENERALITY

Form Code: FxDDC.3

LIFE CYCLE PHASE:

DETAIL DESIGN

SOURCE(S):

FxDDM.4

☐

SYSTEM

NAME: _____

☐

SUBSYSTEM

☐

MODULE

I. METRIC SUMMARY WORKSECTION:

1. Generality Checklist

SCORE

☐

II. CRITERIA WORKSECTION:

Criteria Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Metrics}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the metrics above?
(1-10) _____ (§ If you are unable to evaluate)

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

FLEXIBILITY

Form Code: FxDDF.1

LIFE CYCLE PHASE:

DETAIL DESIGN

SOURCE(S):

FxDDC.1

FxDDC.2

☐

SYSTEM

NAME: _____

☐

SUBSYSTEM

☐

MODULE

FxDDC.3

I. CRITERIA SUMMARY WORKSECTION:

1. Expandability

2. Modularity

3. Generality

SCORE

☐☐☐

II. FACTOR WORKSECTION:

Factor Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Criteria}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the criteria above?
(1-10) _____ (Ø If you are unable to evaluate)

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

FLEXIBILITY

Complete this score chart if an application of this set of worksheets is appropriate when products of A1, A2, A3, A4, B and D in Design phase become available.

<u>Data Element Number</u>	<u>Answer of Data Element</u>	<u>Data Element Score</u>	<u>Metric Score</u>	<u>Criteria Score</u>	<u>Factor Score</u>	
<u>98</u>						
<u>99</u>						
<u>84</u>						
<u>87</u>						
<u>88</u>						
<u>89</u>						
<u>90</u>						
<u>91</u>						
<u>92</u>						
<u>93</u>						
<u>94</u>						
<u>95</u>						

FIRST MEASUREMENT

Date _____

FLEXIBILITY

Complete this score chart if a second (or iterative) application of this set of worksheets is appropriate for update when the products of C in Coding and Checkout phase becomes available.

<u>Data Element Number</u>	<u>Answer of Data Element</u>	<u>Data Element Score</u>	<u>Metric Score</u>	<u>Criteria Score</u>	<u>Factor Score</u>
<u>98</u>					
<u>99</u>					
<u>84</u>					
<u>87</u>					
<u>88</u>					
<u>89</u>					
<u>90</u>					
<u>91</u>					
<u>92</u>					
<u>93</u>					
<u>94</u>					
<u>95</u>					

SECOND MEASUREMENT

Date _____

FLEXIBILITY

Complete this score chart if a third application of this set of worksheets is appropriate for update when products of B-D3, B-D4 in Test and Integration phase become available.

Data Element Number	Answer of Data Element	Data Element Score	Metric Score	Criteria Score	Factor Score
98					
99					
84					
87					
88					
89					
90					
91					
92					
93					
94					
95					

THIRD MEASUREMENT

Date _____

MODULAR IMPLEMENTATION MEASURE

Form Code: FxIMM.1

LIFE CYCLE PHASE:

SOURCE(S):

IMPLEMENTATION

- ☐ SYSTEM
☐ SUBSYSTEM
☐ MODULE

NAME: _____

I. DATA COLLECTION WORKSECTION:

SCORE

1.0 Controlling Parameters (87)

1.1 Number of calling sequence parameters that are control variables. ☐

1.2 Number of calling sequence parameters. ☐

Score = +

2.0 Controlling Input (88)

2.1 Is input passed as calling sequence parameters?

Yes = 1, No = 0

3.0 Controlling Output (89)

3.1 Is output data passed back to calling module?

Yes = 1, No = 0

4.0 Controlling Return (90)

4.1 Is control returned to calling module?

Yes = 1, No = 0

II. METRIC WORKSECTION:

Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the data elements above? (1-10) _____ (Ø If you are unable to evaluate)

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

GENERALITY CHECKLIST

Form Code: FxIMM.2

LIFE CYCLE PHASE:

IMPLEMENTATION

SOURCE(S):

- ☐ SYSTEM
☐ SUBSYSTEM
☐ MODULE

NAME: _____

I. DATA COLLECTION WORKSECTION:

SCORE

1.0 Unmixed Processing and Input/Output (92)

1.1 Does the module not mix input, output, and processing functions in the same module?

☐ Y ☐ N

☐

Yes = 1, No = 0

2.0 Machine Dependent Functions (93)

2.1 Number of machine dependent functions performed.

☐

☐

Score = 1 + ☐ 2.1

3.0 Unlimited Data Volume (94)

3.1 Can the amounts of data that can be processed be unlimited?

☐ Y ☐ N

☐

Yes = 1, No = 0

4.0 Unlimited Data Value (95)

4.1 In the Implementation Phase, is the value of data that can be processed unlimited?

☐ Y ☐ N

☐

Yes = 1, No = 0

II. METRIC WORKSECTION:

Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the data elements above? (1-10) _____ (Ø If you are unable to evaluate)

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

EXTENSIBILITY MEASURE

Form Code: FxIMM.3

LIFE CYCLE PHASE:

IMPLEMENTATION

SOURCE(S):

☐ SYSTEM

NAME: _____

☐ SUBSYSTEM

☐ MODULE

I. DATA COLLECTION WORKSECTION:

SCORE

1.0 Accuracy, Convergence and Timing Attributes (84)

1.1 Are accuracy, convergence, or timing attributes parametric?

☐ Y ☐ N

Yes = 1, No = 0

☐

II. METRIC WORKSECTION:

Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the data elements above? (1-10) _____ (0 If you are unable to evaluate)

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

QUANTITY OF COMMENTS MEASURE

Form Code: FxIMM.4

LIFE CYCLE PHASE:

IMPLEMENTATION

☐ SYSTEM

☐ SUBSYSTEM

☐ MODULE

NAME: _____

SOURCE(S): _____

I. DATA COLLECTION WORKSECTION:

1.0 Quantity of Comments (117)

1.1 Number of non-blank lines of comments. ☐

1.2 Number of non-blank lines. ☐

Score = ☐ 1.1 + ☐ 1.2

SCORE

II. METRIC WORKSECTION:

Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the data elements above?
(1-10) _____ (Ø If you are unable to evaluate)

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

EFFECTIVENESS OF COMMENTS MEASURE

Form Code: FxIMM.5

LIFE CYCLE PHASE:
IMPLEMENTATION

SOURCE(S):

- ☐ SYSTEM
☐ SUBSYSTEM
☐ MODULE

NAME: _____

I. DATA COLLECTION WORKSECTION:

SCORE

1.0 Prologue Comments (118)

1.1 Are there prologue comments containing information about the function, author, version number, date inputs, outputs, assumptions and limitations?

☐ Y ☐ N

Yes = 1, No = 0

☐

2.0 Control and Destinations Comment (119)

2.1 How many decisions points and transfers of control are not commented?

☐

2.2 Total number of decision points.

☐

☐

Score = 1 - (☐ 2.1 + ☐ 2.2)

3.0 Machine Dependent Code Comment (120)

3.1 Is all machine language code commented?

☐ Y ☐ N

Yes = 1, No = 0

☐

4.0 Non-standard HOL Statements Comment (121)

4.1 Are non-standard HOL Statements Commented?

☐ Y ☐ N

Yes = 1, No = 0

☐

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

EFFECTIVENESS OF COMMENTS MEASURE (Continued)

Form Code: FxIMM.5

LIFE CYCLE PHASE: IMPLEMENTATION		SOURCE(S):	
☐ SYSTEM	NAME: _____	_____	
☐ SUBSYSTEM	_____	_____	
☐ MODULE	_____	_____	

I. DATA COLLECTION WORKSECTION (continued):			SCORE
5.0 Declared Variables Commented (122)			
5.1 How many declared variables are <u>not</u> described by comments?			
5.2 Number of variables.			
Score=1-(5.1 + 5.2)			
6.0 Comments Which Do Not Only Repeat the Operation (124)			
6.1 Do the comments do more than repeat the operation?	Y N		
Yes = 1, No = 0			
7.0 Identification of Comments (137)			
7.1 Are comments set off from the code in a uniform manner?	Y N		
Yes = 1, No = 0			
II. METRIC WORKSECTION:			
Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$			
III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the data elements above? (1-10) _____ (Ø If you are unable to evaluate)			
IV. INSPECTOR'S COMMENTS:			

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

DESCRIPTIVENESS OF IMPLEMENTATION LANGUAGE MEASURE

Form Code: FxIMM.6

LIFE CYCLE PHASE:

IMPLEMENTATION

SOURCE(S):

☐ SYSTEM

NAME: _____

☐ SUBSYSTEM

☐ MODULE

I. DATA COLLECTION WORKSECTION:

SCORE

1.0 High Order Language (107)

1.1 Is high order language used? ☐ Y ☐ N

Yes = 1, No = 0

2.0 Variable Names (123)

2.1 Are variable name (mnemonics) descriptive of the physical or functional property they represent? ☐ Y ☐ N

Yes = 1, No = 0

3.0 Blocked and Indented Source Code (125)

3.1 Is the code logically blocked and indented? ☐ Y ☐ N

Yes = 1, No = 0

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

DESCRIPTIVENESS OF IMPLEMENTATION LANGUAGE MEASURE (Continued)

Form Code: FxIM.6

LIFE CYCLE PHASE:

IMPLEMENTATION

☐

SYSTEM

☐

SUBSYSTEM

☐

MODULE

NAME: _____

SOURCE(S):

I. DATA COLLECTION WORKSECTION (continued):

SCORE

4.0 One Statement Per Line (126)

4.1 Number of lines with more than one statement. ☐

4.2 Number of continuous lines. ☐

4.3 The total number of lines in a module. ☐

$$\text{Score} = 1 - \left(\frac{\boxed{4.1} + \boxed{4.2}}{\boxed{4.3}} \right)$$

☐

II. METRIC WORKSECTION:

Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the data elements above?
(1-10) _____ (Ø If you are unable to evaluate)

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

MODULARITY

Form Code: FxIMC.1

LIFE CYCLE PHASE:
IMPLEMENTATION

SOURCE(S):
FxIMM.1

- ☐ SYSTEM
☐ SUBSYSTEM
☐ MODULE

NAME: _____

I. METRIC SUMMARY WORKSECTION:

1. Modular Implementation Measure

SCORE

☐

II. CRITERIA WORKSECTION:

Criteria Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Metrics}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the metrics above?
(1-10) _____ (§ If you are unable to evaluate)

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

GENERALITY

Form Code: FxIMC.2

LIFE CYCLE PHASE:

IMPLEMENTATION

SOURCE(S):

FxIMM.2

☐

SYSTEM

NAME: _____

☐

SUBSYSTEM

☐

MODULE

I. METRIC SUMMARY WORKSECTION:

1. Generality Checklist

SCORE

☐

II. CRITERIA WORKSECTION:

Criteria Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Metrics}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the metrics above?
(1-10) _____ (# If you are unable to evaluate)

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

EXPANDABILITY

Form Code: FxIMC.3

LIFE CYCLE PHASE:

IMPLEMENTATION

SOURCE(S):

FxIMM.3

☐

SYSTEM

NAME: _____

☐

SUBSYSTEM

☐

MODULE

I. METRIC SUMMARY WORKSECTION:

1. Extensibility Measure

SCORE

☐

II. CRITERIA WORKSECTION:

Criteria Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Metrics}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the metrics above?
(1-10) _____ (§ If you are unable to evaluate)

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

SELF-DESCRIPTIVENESS

Form Code: FxIMC.4

LIFE CYCLE PHASE:

IMPLEMENTATION

SOURCE(S):

FxIMM.4

FxIMM.5

☐ SYSTEM

NAME: _____

☐ SUBSYSTEM

☐ MODULE

FxIMM.6

I. METRIC SUMMARY WORKSECTION:

1. Quantity of Comments Measure
2. Effectiveness of Comments Measure
3. Descriptiveness of Implementation Language Measure

SCORE

☐☐☐

II. CRITERIA WORKSECTION:

Criteria Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Metrics}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the metrics above?
(1-10) _____ (§ If you are unable to evaluate)

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

FLEXIBILITY

Form Code: FxIMF.1

LIFE CYCLE PHASE:

IMPLEMENTATION

SOURCE(S):

FxIMC.1

FxIMC.2

☐ SYSTEM

NAME: _____

☐ SUBSYSTEM

FxIMC.4

FxIMC.3

☐ MODULE

I. CRITERIA SUMMARY WORKSECTION:

1. Modularity
2. Generality
3. Expandability
4. Self-Descriptiveness

SCORE

☐
☐
☐
☐

II. FACTOR WORKSECTION:

Factor Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Criteria}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the criteria above?
(1-10) _____ (Ø If you are unable to evaluate)

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

FLEXIBILITY

Complete this scorechart if an application of this set of worksheets is appropriate when products of A and B in Coding and Checkout phase become available.

<u>Data Element Number</u>	<u>Answer of Data Element</u>	<u>Data Element Score</u>	<u>Metric Score</u>	<u>Criteria Score</u>	<u>Factor Score</u>
<u>87</u>					
<u>88</u>					
<u>89</u>					
<u>90</u>					
<u>92</u>					
<u>93</u>					
<u>94</u>					
<u>95</u>					
<u>84</u>					
<u>117</u>					
<u>118</u>					
<u>119</u>					
<u>120</u>					
<u>121</u>					
<u>122</u>					
<u>124</u>					
<u>137</u>					
<u>107</u>					
<u>123</u>					
<u>125</u>					
<u>126</u>					

FIRST MEASUREMENT

Date

FLEXIBILITY

Complete this scorechart if a second application of this set of worksheets is appropriate for update when product of B-D2 in Test and Integration phase becomes available.

<u>Data Element Number</u>	<u>Answer of Data Element</u>	<u>Data Element Score</u>	<u>Metric Score</u>	<u>Criteria Score</u>	<u>Factor Score</u>
<u>87</u>					
<u>88</u>					
<u>89</u>					
<u>90</u>					
<u>92</u>					
<u>93</u>					
<u>94</u>					
<u>95</u>					
<u>84</u>					
<u>117</u>					
<u>118</u>					
<u>119</u>					
<u>120</u>					
<u>121</u>					
<u>122</u>					
<u>124</u>					
<u>137</u>					
<u>107</u>					
<u>123</u>					
<u>125</u>					
<u>126</u>					

SECOND MEASUREMENT Date _____

FLEXIBILITY

Complete this scorechart if a third application of this set of worksheets is appropriate for update.

<u>Data Element Number</u>	<u>Answer of Data Element</u>	<u>Data Element Score</u>	<u>Metric Score</u>	<u>Criteria Score</u>	<u>Factor Score</u>
<u>87</u>					
<u>88</u>					
<u>89</u>					
<u>90</u>					
<u>92</u>					
<u>93</u>					
<u>94</u>					
<u>95</u>					
<u>84</u>					
<u>117</u>					
<u>118</u>					
<u>119</u>					
<u>120</u>					
<u>121</u>					
<u>122</u>					
<u>124</u>					
<u>137</u>					
<u>107</u>					
<u>123</u>					
<u>125</u>					
<u>126</u>					

THIRD MEASUREMENT

Date

QUALITY FACTOR

MODULE NO. 8

TESTABILITY

TABLE OF CONTENTS

<u>TITLE</u>	<u>PAGE</u>
<u>INTRODUCTION AND INSTRUCTIONS FOR TESTABILITY MODULE</u>	
INTRODUCTION TO TESTABILITY	Te-1
STEPS FOR COMPLETING WORKSHEETS	Te-5
STEPS FOR UPDATE APPLICATIONS	Te-8
HOW TO USE SCORE CHART SETS	Te-9
ESD PRODUCTS FOR ANALYSIS PHASE	Te-12
ESD PRODUCTS FOR DESIGN PHASE	Te-13
ESD PRODUCTS FOR CODING AND CHECKING PHASE. .	Te-14
ESD PRODUCTS FOR TEST AND INTEGRATION PHASE .	Te-15
 <u>QUALITY FACTOR NO. 8 TESTABILITY WORKSHEETS</u>	
WORKSHEETS FOR PRELIMINARY DESIGN PHASE . . .	Te-16
WORKSHEETS FOR DETAIL DESIGN PHASE.	Te-28
WORKSHEETS FOR IMPLEMENTATION PHASE	Te-37

This QUALITY FACTOR MODULE is one of a set of eleven modules that are components of the "COMPUTER SYSTEMS ACQUISITION METRICS HANDBOOK".

INTRODUCTION AND INSTRUCTIONS
FOR
TESTABILITY MODULE

INTRODUCTION TO TESTABILITY

The Quality Factor Testability represents a measure of the effort required to test a program to insure it performs its intended function. FIGURES Te - 1 through Te - 4 represent the hierarchy of Metric, Criteria and Quality Factor worksheets associated with Testability in Requirements Analysis, Preliminary Design, Detailed Design and Implementation phases of the Software Development Life Cycle.

The worksheets in this module are grouped into four separate sets, one set for each Life Cycle phase. Each set consists of Metric worksheets, Criteria worksheets, a Factor worksheet and score charts.

METRIC WORKSHEETS

One or more DATA COLLECTION WORKSECTIONS which contain the data element scores for each Metric, and each Metric's Final Score.

CRITERIA WORKSHEETS

One or more METRIC SUMMARY WORKSECTIONS which contain the Metrics scores for each Criteria, and each Criteria's Final Score.

FACTOR WORKSHEETS

One CRITERIA SUMMARY WORKSECTION which contains each Criteria's score, and the Final Score for the Factor for that phase.

SCORE CHARTS:

One or more charts that record worksheet values throughout the Life Cycle.

However, the sequence in which the worksheet sets are applied is dependent on the availability of ESD Computer Program Life Cycle products. Usually the worksheets will be applied sequentially, except for updates.

These instructions show when the Testability worksheet sets and Score Charts are applied during the Computer Program Life Cycle. The Product Code referred to on the Score Charts is the code defined in the ESD Guidebook Series, Software Acquisition Management Guidebook, Life Cycle Events and reillustrated in the General Instructions. The Product Tables map the ESD Computer Program Life Cycle Products to the Metric Worksheets. The balance of these instructions are step-by-step procedures for completing the worksheets and score chart summaries.

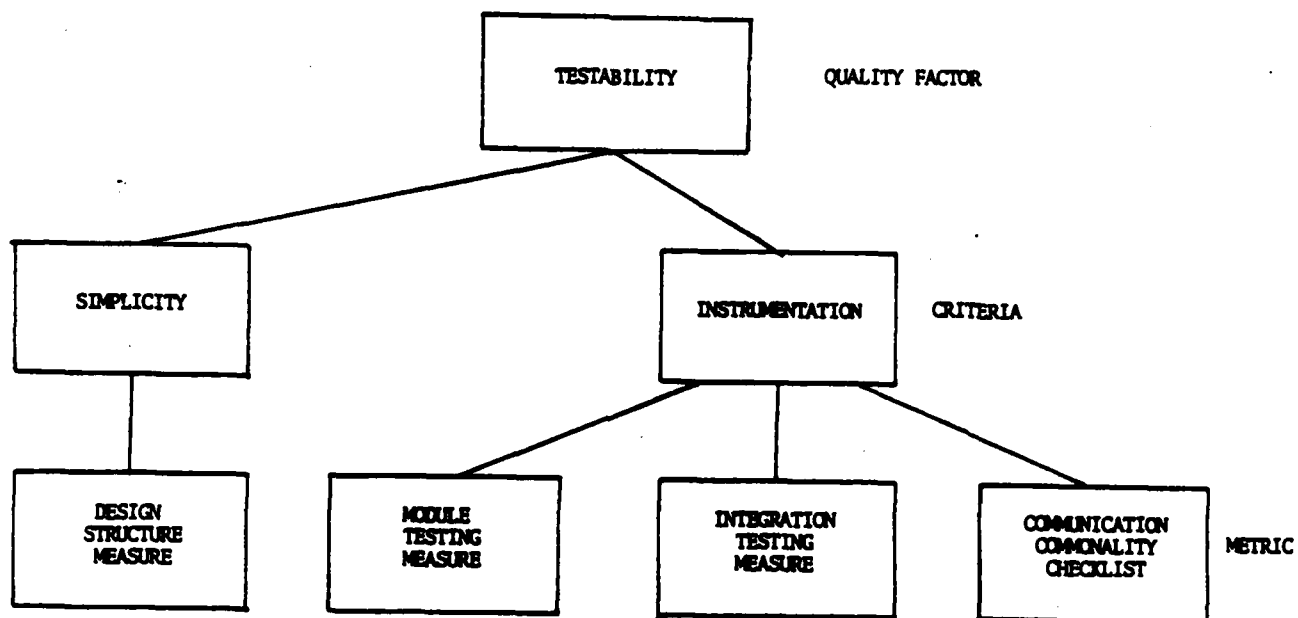


FIGURE Te-1
PRELIMINARY DESIGN WORKSHEET HIERARCHY

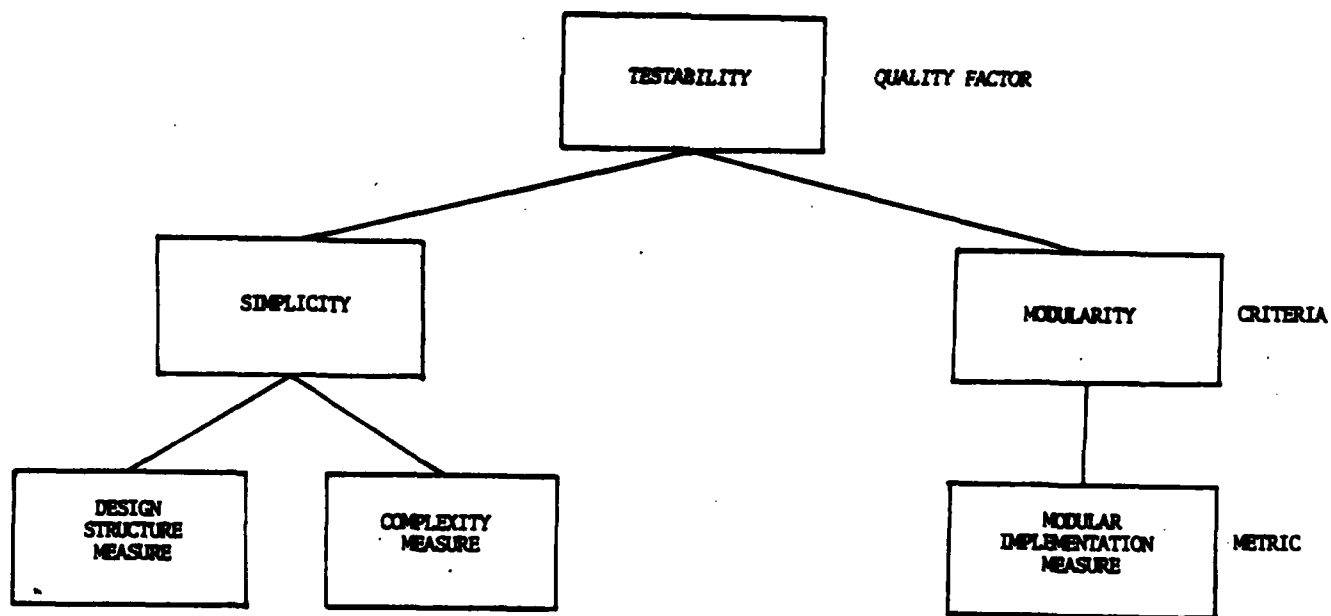


FIGURE Te-2
DETAILED DESIGN WORKSHEET HIERARCHY

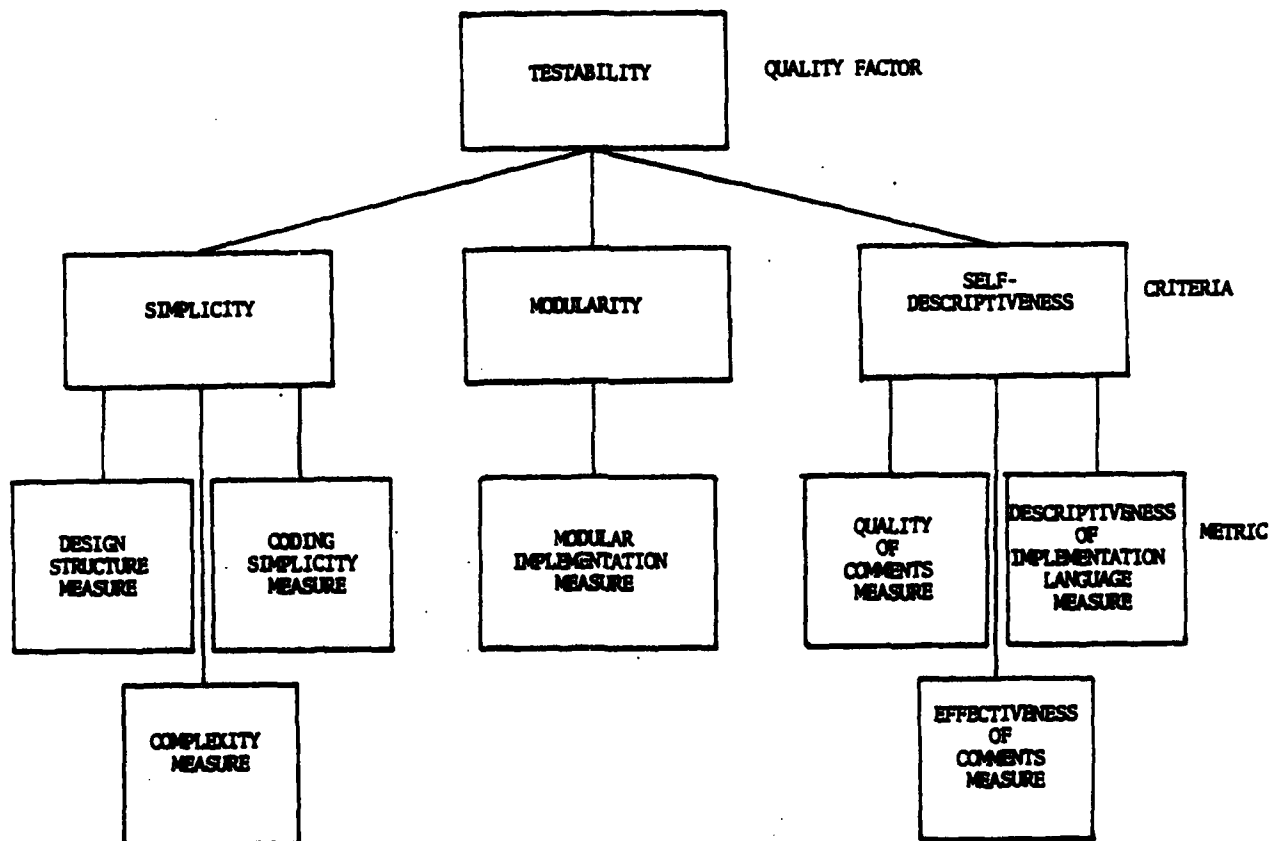


FIGURE Te-3
IMPLEMENTATION WORKSHEET HIERARCHY

STEPS FOR COMPLETING WORKSHEETS

Step 1

Enter the appropriate information in the following blocks:

- (1.1) SYSTEM/SUBSYSTEM/MODULE block-Indicate the level of application.
- (1.2) NAME block-List the name of the system being measured.
- (1.3) SOURCE block-On Metric Worksheets, list the source document.
- (1.4) The PREPARED BY and DATE blocks should contain the name of the person performing the software metrics, and the current date.

Step 2

Determine the current Computer Program Life Cycle Phase. This module is concerned with four phases of the Computer Program Life Cycle:

- (2.1) Requirements Analysis
- (2.2) Preliminary Design
- (2.3) Detail Design
- (2.4) Implementation

Step 3

Determine the available products from the phase and which data worksheet set to apply. Each Life Cycle phase has at least three different activities associated with it. The result of the completion of an activity is one or more documents called products.

Before a worksheet set can be applied, specific products associated with it must be obtained. The Product Tables, at the end of the instructions, detail the products required for each worksheet set.

Step 4 - METRIC WORKSHEETS

- (4.1) Answer each question in the Data Collection Worksection as it applies to the system/subsystem/module you are measuring and transfer its scored value to its corresponding SCORE block.

If the question calls for a YES/NO type response, a YES answer is scored at a 1.
a NO answer is scored as a 0.

The questions that call for a numeric quantity type response have specific instructions on how to score the response. Follow the instructions under each data element.

- (4.2) Find the Metric Value by following the algorithm on the worksheet.
- (4.3) Answer the Evaluation Worksection - evaluate the products based on the data elements as they apply to the system.
- (4.4) When you have repeated this procedure for all the Metric Worksheets in the set, you are ready to use the Criteria Worksheets.

Step 5 - CRITERIA WORKSHEETS

- (5.1) Each numbered item in the Metric Summary Worksection represents an individual Metric Value.

- (5.2) Find the Form Code in the SOURCE box of the Criteria Worksheet.
- (5.3) Find the Metric Worksheet with the same Form Code and transfer its Metric Value into the box to the right of the item in the Criteria Worksheet.
- (5.4) Repeat this process for all items in the Metric Summary Worksection.
- (5.5) Find the Criteria Value by following the algorithm on the worksheet.
- (5.6) Answer the Evaluation Worksection - evaluate the products based on the Metrics as they apply to the system.

Step 6 - FACTOR WORKSHEETS

- (6.1) Each numbered item in the Criteria Summary Worksection represents an individual Criterion Value.
- (6.2) Find the Form Code in the SOURCE box of the Factor Worksheet.
- (6.3) Find the Criteria Worksheet with the same Form Code and transfer its Criteria Value into the box in the Score column in the Factor Worksheet.
- (6.4) Repeat this process for all items in the Criteria Summary Worksection.
- (6.5) Answer the Evaluation Worksection - evaluate the products based on the Criteria as they apply to the system.
- (6.6) Find the Factor Value by following the algorithm on the Worksheet.

STEPS FOR UPDATE APPLICATIONS

Step 1

Determine the update necessary. The Product Tables at the end of these instructions list the updates required and the activities and products associated with each update. Also review Section 2.3.2, "Update Information Requirements", in the General Instructions Handbook for further information if necessary.

Step 2

Obtain the required products. The Products Tables at the end of these Instructions list the products required for each update application.

Step 3

Reapply the Metric, Criteria, and Factor worksheets by following the procedure already outlined in "Steps for Completing Worksheets", of these Instructions. "How to Use Score Chart sets", explains the procedure for reporting the update scores.

HOW TO USE SCORE CHART SETS

When you apply worksheets to system/subsystem/module, you must apply some worksheets more than once in the Computer Program Life Cycle. Because of this, a Score Chart set is organized so that the groups of worksheet scores, acquired at the times a set of worksheets is applied, can be recorded separately: originals & updates.

The Score Chart set (at the end of each worksheet set) is composed of similar tree structure diagrams. Each Score Chart represents the complete hierarchy of scores to be acquired during any one application of worksheets sets in the Life Cycle.

When applying any worksheet, in order to record scores you must locate and use the Score Chart that corresponds to the current phase in the Life Cycle. In a Score Chart set, the first Score Chart (labeled FIRST MEASUREMENT) is designed to receive the scores from the first application of a worksheet set in the Life Cycle, and the following charts (i.e., labeled SECOND MEASUREMENT, etc.) are designed to receive the scores from the updates.

Each data element in the Metrics Worksheet has a unique number in the Data Element Dictionary, which is listed in the first column in the Score Chart. The next two columns of boxes in a Score Chart show a worksheet set's individual data element raw scores and its interpreted response (Yes/No, = 1 or 0, etc.). The last three box columns map out the Metric, Criteria and Factor worksheets of a set, each box representing the total score of a corresponding worksheet.

Once you have finished scoring a Worksheet set and located the corresponding Score Chart set, use the following procedure for filling out the Score Chart:

Step 1 - ANSWER OF DATA ELEMENT/DATA ELEMENT SCORE

For each data element in a Metric Worksheet:

- (1.1) Reference its number in the "Data Element Number" Column in the Score Chart.
- (1.2) Transfer the answers you gave to the questions in the Data Collection Worksection to the corresponding box under the column headed "Answer of Data Element"
- (1.3) Transfer the Scores of the data element from the Data Collection Worksection to its corresponding box under column labeled "Data Element Score".
- (1.4) Repeat this step for all data elements within this phase.

Step 2 - METRIC SCORE

Each box in this column represents the Score from the Metric Worksection of a Metric Worksheet. Transfer the Metric Value from each Metric Worksheet into the corresponding boxes in the Score Chart's Metric Score Column.

Step 3 - CRITERIA SCORE

Each box in this column represents the score from the Criteria Worksection of a Criteria Worksheet into the corresponding boxes of the Score Chart's Criteria Score Column.

Step 4 - FACTOR SCORE

Each box in this column represents the score from the Factor Worksection of a Quality Factor Worksheet. Transfer the Factor from the set's Factor Worksheet into corresponding boxes of the Score Chart's Factor Score Column.

These Score Chart sets will provide a historical base for repeated application of the metrics to a system at all levels. They are also a useful means of reporting your finds to the program manager in a condensed and compact form.

PRODUCTS	TRADE-OFF STUDY REPORTS	INITIAL OR AUTHENTICATED SYSTEM SPEC, SEGMENT SPEC	AUTHENTICATED DEVELOPMENT SPEC FOR CPCI	HIGHER LEVEL SPEC	DRAFT PRODUCT SPECS	PDR MINUTES AND ACTION ITEM RESPONSES
WORKSHEET SET TO BE APPLIED	REQUIREMENTS ANALYSIS WORKSHEETS				PRELIMINARY DESIGN WORKSHEETS	

ESD PRODUCTS FOR ANALYSIS PHASE

Apply the Requirement Analysis Worksheets as the following types of products become available. See note below.

- Product A.1 - Trade-off Study Reports
- Product A.2 - Initial or Authenticated System Specification & Segment Specification (if any)
- Product B.1 - Authenticated Development Specification for each CPCI
- Product B.2 - Possible higher-level specification, ICD and changes

Apply the Preliminary Design Worksheets as the following types of products become available. See note below.

- Product B.3 - Parts of draft Product Specifications containing design approaches for each CPCI
- Product C. - PDR minutes and action item responses

NOTE: If these products do not contain the information requested by the Data Element questions, other contractor-supplied information should be searched.

PRODUCTS	FUNCTIONAL FLOW CHARTS	DE- TAILED FLOW CHART	DATA FORMAT DESC.	ALGO- RITHM DESC.	PRELIMI- NARY PRODUCT DESC.	CDR MINUTES ACTION ITEM RESPON- SES	SYSTEM SEG- MENT TEST PLANS	PRELIM. CPCI TEST PRO- CEDURES
WORKSHEET SET TO BE APPLIED	DETAILED DESIGN WORKSHEETS						PRELIMINARY DESIGN WORKSHEETS, (UPDATE)	

ESD PRODUCTS FOR DESIGN PHASE

Apply the Detailed Design Worksheets as the following types of products become available. See note below.

- Product A.1: Functional flowcharts
- Product A.2: Detailed flowcharts
- Product A.3: Data format descriptions
- Product A.4: Descriptions of algorithms not previously prescribed
- Product B. : Preliminary Product Specifications, including the above
- Product D. : CDR minutes & action item responses

Apply the Preliminary Design Worksheets for Update as the following types of products become available. See note.

- Product C.1: System, Segment and CPCI Test Plans
- Product C.2: Preliminary CPCI Test Procedures

NOTE: If these products do not contain the information requested by the Data Element questions, other contractor-supplied information should be searched.

PRODUCTS	CODE	ALTERED PRODUCT SPECS
WORKSHEET SET TO BE APPLIED	IMPLEMENTATION WORKSHEETS	DETAILED DESIGN WORKSHEETS (UPDATE)

ESD PRODUCTS FOR CODING AND CHECKING PHASE

Apply the Implementation Worksheets as the code becomes available.

Apply the Detailed Design Worksheets for Update as the following types of products become available. See note below.

- Product C. - Altered Product Specifications, including compiler/assembly listings.

NOTE: If these products do not contain the information requested by the Data Element questions, other contractor-supplied information should be searched.

PRODUCTS	FINAL CPCI TEST PROCEDURES	SEGMENT & SYSTEM LEVEL TEST PROCEDURES	TEST REPORTS	CODING CHANGES	MODIFIED PRODUCT SPECS	HIGH LEVEL SPECS
WORKSHEET SET TO BE APPLIED	PRELIMINARY DESIGN WORKSHEETS			IMPLEMEN- TATION WORKSHEETS	DETAILED DESIGN WORKSHEETS (UPDATE)	

ESD PRODUCTS FOR TEST AND
INTEGRATION PHASE

Apply the Preliminary Design Worksheets for Update as the following types of products become available. See note below.

- ^A Product 1: Final CPCI Test Procedures
- Product 2: Segment (if any) and system-level Test Procedures
- ^{B-D} Product 1: Test Reports

Apply the Implementation Worksheets for Update as the following types of products become available. See note below.

- ^{B-D} Product 2: Computer Program Coding Changes

Apply the Detailed Design Worksheets for Update as the following types of products become available. See note.

- ^{B-D} Product 3: Modified Product Specification
- Product 4: Possible high-level specification, ICD and changes.

NOTE: If these products do not contain the information requested by the Data Element questions, other contractor-supplied information should be searched.

DESIGN STRUCTURE MEASURE

Form Code: TePDM.1

LIFE CYCLE PHASE:

PRELIMINARY DESIGN

SOURCE(S):

- ☐ SYSTEM
☐ SUBSYSTEM
☐ MODULE

NAME: _____

I. DATA COLLECTION WORKSECTION:

SCORE

1.0 Hierarchical Structure (35)

1.1 Is a hierarchical chart provided which identifies all modules in the system?

☐ Y ☐ N

Yes = 1, No = 0

2.0 Module Independence (36)

2.1 Is the module independent of the source of the input or the destination of the output?

☐ Y ☐ N

Yes = 1, No = 0

3.0 Size of Data Base (70)

3.1 Number of unique data items in data base.

Score = 1 + 3.1

II. METRIC WORKSECTION:

Metric Value =

**III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the data elements above?
 (1-10) _____ (§ If you are unable to evaluate)**

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

MODULE TESTING MEASURE

Form Code: TePDM.2

LIFE CYCLE PHASE:

PRELIMINARY DESIGN

SOURCE(S):

☐ SYSTEM

NAME: _____

☐ SUBSYSTEM

☐ MODULE

I. DATA COLLECTION WORKSECTION:

SCORE

1.0 Path Coverage (64)

1.1 Number of paths to be tested.

1.2 Total number of paths.

Score = 1.1 + 1.2

2.0 Input Parameters Boundary Tested (65)

2.1 Number of input parameters to be tested.

2.2 Total number of input parameters.

Score = 2.1 + 2.2

II. METRIC WORKSECTION:

Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the data elements above? (1-10) _____ (Ø If you are unable to evaluate)

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

INTEGRATION TESTING MEASURE

Form Code: TePDM.3

LIFE CYCLE PHASE:

PRELIMINARY DESIGN

SOURCE(S):

- ☐ SYSTEM
☐ SUBSYSTEM
☐ MODULE

NAME: _____

I. DATA COLLECTION WORKSECTION:

SCORE

1.0 Module Interfaces Tested (66)

1.1 Number of interfaces to be tested.

1.2 Total number of interfaces.

Score = 1.1 + 1.2

2.0 Performance Requirements Coverage (67)

2.1 Number of performance requirements to be tested.

2.2 Total number of performance requirements.

Score = 2.1 + 2.2

II. METRIC WORKSECTION:

Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the data elements above?
(1-10) _____ (0 If you are unable to evaluate)

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

SYSTEM TESTING MEASURE

Form Code: TePDM.4

LIFE CYCLE PHASE:

PRELIMINARY DESIGN

SOURCE(S):

- ☐ SYSTEM
☐ SUBSYSTEM
☐ MODULE

NAME: _____

I. DATA COLLECTION WORKSECTION:

SCORE

1.0 Module Coverage (68)

1.1 Number of modules to be exercised. ☐

1.2 Number of modules. ☐

Score = ☐ 1.1 + ☐ 1.2

☐

2.0 Identification of Test Inputs and Outputs in Summary Form (69)

2.1 Are test inputs and outputs provided in summary form? ☐ Y ☐ N

Yes = 1, No = 0

☐

II. METRIC WORKSECTION:

Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$

☐

**III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the data elements above?
 (1-10) _____ (# If you are unable to evaluate)**

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

SIMPLICITY

Form Code: TePDC.1

LIFE CYCLE PHASE:

PRELIMINARY DESIGN

SOURCE(S):

TePDM.1

☐

SYSTEM

NAME: _____

☐

SUBSYSTEM

☐

MODULE

I. METRIC SUMMARY WORKSECTION:

1. Design Structure Measure

SCORE

☐

II. CRITERIA WORKSECTION:

Criteria Value $\frac{\text{Sum of Above Scores}}{\text{No. of Metrics}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the metrics above?
(1-10) _____ (§ If you are unable to evaluate)

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

INSTRUMENTATION

Form Code: TePDC.2

LIFE CYCLE PHASE:

PRELIMINARY DESIGN

SOURCE(S):

TePDM.2

TePDM.3

☐ SYSTEM

NAME: _____

☐ SUBSYSTEM

☐ MODULE

I. METRIC SUMMARY WORKSECTION:

1. Module Testing Measure
2. Integration Testing Measure

SCORE

☐☐☐

II. CRITERIA WORKSECTION:

Criteria Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Metrics}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the metrics above?
(1-10) _____ (§ If you are unable to evaluate)

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

SYSTEM TESTING SUPPORT

Form Code: TePDC.3

LIFE CYCLE PHASE:

PRELIMINARY DESIGN

SOURCE(S):

TePDM.4

☐ SYSTEM

NAME: _____

☐ SUBSYSTEM

☐ MODULE

I. CRITERIA SUMMARY WORKSECTION:

1. System Testing Measure

SCORE

☐

II. FACTOR WORKSECTION:

Factor Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Criteria}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the criteria above?
(1-10) _____ (# If you are unable to evaluate)

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

TESTABILITY

Form Code: TePDF.1

LIFE CYCLE PHASE:

PRELIMINARY DESIGN

SOURCE(S):

TePDC.1

TePDC.2

☐ SYSTEM

NAME: _____

☐ SUBSYSTEM

TePDC.3

☐ MODULE

I. CRITERIA SUMMARY WORKSECTION:

1. Simplicity
2. Instrumentation
3. System Testing Support

SCORE

☐
☐
☐

II. FACTOR WORKSECTION:

Factor Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Criteria}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the criteria above?
(1-10) _____ (§ If you are unable to evaluate)

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

TESTABILITY

Complete this score chart if an application of this set of worksheets is appropriate when products of B3, C in analysis phase become available.

Data Element Number	Answer of Data Element	Data Element Score	Metric Score	Criteria Score	Factor Score	
<u>35</u>						
<u>36</u>						
<u>70</u>						
<u>64</u>						
<u>65</u>						
<u>66</u>						
<u>67</u>						
<u>68</u>						
<u>69</u>						

FIRST MEASUREMENT

Date _____

TESTABILITY

Complete this score chart if a second application of this set of worksheets is appropriate for update when products of C1 and C2 in Design Phase are available.

Data Element Number	Answer of Data Element	Data Element Score	Metric Score	Criteria Score	Factor Score
<u>35</u>					
<u>36</u>					
<u>70</u>					
<u>64</u>					
<u>65</u>					
<u>66</u>					
<u>67</u>					
<u>68</u>					
<u>69</u>					

SECOND MEASUREMENT

Date _____

TESTABILITY

Complete this score chart if a third application of this set of worksheets is appropriate for update when products of A1, A2, and B-D1 in Test and Integration Phase are available.

Data Element Number	Answer of Data Element	Data Element Score	Metric Score	Criteria Score	Factor Score	
<u>35</u>						
<u>36</u>						
<u>70</u>						
<u>64</u>						
<u>65</u>						
<u>66</u>						
<u>67</u>						
<u>68</u>						
<u>69</u>						

THIRD MEASUREMENT

Date _____

TESTABILITY

Complete this score chart if a Fourth application of this set of worksheets is appropriate for update when products of A1, A2 and B-D1 in Test and Integration phase are available:

Data Element Number	Answer of Data Element	Data Element Score	Metric Score	Criteria Score	Factor Score
<u>35</u>					
<u>36</u>					
<u>70</u>					
<u>64</u>					
<u>65</u>					
<u>66</u>					
<u>67</u>					
<u>68</u>					
<u>69</u>					

FOURTH MEASUREMENT

Date _____

<u>COMPLEXITY MEASURE</u>		Form Code: <u>TeDDM.1</u>
LIFE CYCLE PHASE:		SOURCE(S):
DETAIL DESIGN		
☐ SYSTEM ☐ SUBSYSTEM ☐ MODULE	NAME: _____ _____ _____	
I. <u>DATA COLLECTION WORKSECTION:</u> 1.0 <u>Data and Control Flow Complexity (81)</u> 1.1 What is the sum of the number of decision points, subdecision points, conditional branches and unconditional branches? Score = 1 + 1.1 + 1		SCORE
II. <u>METRIC WORKSECTION:</u> Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$		
III. <u>EVALUATION WORKSECTION:</u> What is your evaluation of the reviewed products based on the data elements above? (1-10) _____ (# If you are unable to evaluate)		
IV. <u>INSPECTOR'S COMMENTS:</u>		

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

DESIGN STRUCTURE MEASURE

Form Code: TeDDM.2

LIFE CYCLE PHASE:

DETAIL DESIGN

SOURCE(S):

☐ SYSTEM

NAME: _____

☐ SUBSYSTEM

☐ MODULE

I. DATA COLLECTION WORKSECTION:

SCORE

1.0 Module Processing not Dependent on Prior Processing (82)

1.1 Is the module independent of knowledge of prior processing?

☐ Y ☐ N

Yes = 1, No = 0

2.0 Entrance and Exit of the Module (83)

2.1 Number of entrances into modules.

2.2 Number of Exits from module.

Score = $\left[1 + \left[\boxed{2.1} + 1 \right] \right] + \left[1 + \left[\boxed{2.2} + 1 \right] \right]$

3.0 Description of Input, Output, Processing and Limitations (138)

3.1 Does each module description include input, output, processing and limitations?

☐ Y ☐ N

Yes = 1, No = 0

II. METRIC WORKSECTION:

Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the data elements above? (1-10) _____ (0 If you are unable to evaluate)

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

MODULAR IMPLEMENTATION MEASURE

Form Code: TeDDM.3

LIFE CYCLE PHASE:

DETAIL DESIGN

SOURCE(S):

- ☐ SYSTEM
☐ SUBSYSTEM
☐ MODULE

NAME: _____

I. DATA COLLECTION WORKSECTION:

SCORE

1.0 Controlling Parameters (87)

1.1 Number of calling sequence parameters that are control variables. ☐

1.2 Number of calling sequence parameters. ☐

Score = + ☐

2.0 Controlling Input (88)

2.1 Is input passed as calling sequence parameters? ☐ Y ☐ N

Yes = 1, No = 0 ☐

3.0 Controlling Output (89)

3.1 Is output data passed back to calling module? ☐ Y ☐ N

Yes = 1, No = 0 ☐

4.0 Controlling Return (90)

4.1 Is control returned to calling module? ☐ Y ☐ N

Yes = 1, No = 0 ☐

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

MODULAR IMPLEMENTATION MEASURE

Form Code: TeDIM.3

LIFE CYCLE PHASE:

DETAIL DESIGN

SOURCE(S):

☐ SYSTEM

NAME: _____

☐ SUBSYSTEM

☐ MODULE

I. DATA COLLECTION WORKSECTION (continued):

SCORE

5.0 Share Temporary Storage (91)

5.1 Is temporary storage independent of other modules?

☐ Y ☐ N

Yes = 1, No = 0

☐

II. METRIC WORKSECTION:

Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the data elements above?
(1-10) _____ (Ø If you are unable to evaluate)

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

SIMPLICITY

Form Code: TeDDC.1

LIFE CYCLE PHASE:

DETAIL DESIGN

SOURCE(S):

TeDDM.2

TeDDM.1

☐ SYSTEM

NAME: _____

☐ SUBSYSTEM

☐ MODULE

I. METRIC SUMMARY WORKSECTION:

1. Complexity Measure

2. Design Structure Measure

SCORE

☐
☐

II. CRITERIA WORKSECTION:

Criteria Value $\frac{\text{Sum of Above Scores}}{\text{No. of Metrics}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the metrics above?
(1-10) _____ (§ If you are unable to evaluate)

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

<u>MODULARITY</u>		
		Form Code: <u>TeDDC.2</u>
LIFE CYCLE PHASE: DETAIL DESIGN		SOURCE(S): <u>TeDDM.3</u>
☐ SYSTEM ☐ SUBSYSTEM ☐ MODULE	NAME: _____ _____ _____	
I. <u>METRIC SUMMARY WORKSECTION:</u> 1. Modular Implementation Measure		SCORE ☐
II. <u>CRITERIA WORKSECTION:</u> Criteria Value = $\frac{\text{Sum of Above Score}}{\text{No. of Metrics}}$		☐
III. <u>EVALUATION WORKSECTION:</u> What is your evaluation of the reviewed products based on the metrics above? (1-10) _____ (§ If you are unable to evaluate)		

PREPARED BY: _____ APPROVED BY: _____
 DATE: _____ DATE: _____

TESTABILITY

Form Code: TeDDF.1

LIFE CYCLE PHASE:

DETAIL DESIGN

SOURCE(S):

TeDDC.1

TeDDC.2

☐ **SYSTEM**

NAME: _____

☐ **SUBSYSTEM**

☐ **MODULE**

I. CRITERIA SUMMARY WORKSECTION:

1. Simplicity

2. Modularity

SCORE

☐☐

II. FACTOR WORKSECTION:

Factor Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Criteria}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the criteria above?
(1-10) _____ (0 If you are unable to evaluate)

PREPARED BY: _____ **APPROVED BY:** _____

DATE: _____ **DATE:** _____

TESTABILITY

Complete this score chart if application of this set of worksheets is appropriate when products of A1, A2, A3, A4, B and D in Design Phase become available.

Data Element Number	Answer of Data Element	Data Element Score	Metric Score	Criteria Score	Factor Score
81					
82					
83					
138					
87					
88					
89					
90					
91					

FIRST MEASUREMENT

Date

Complete this score chart if a second application of this set of worksheets is appropriate for update when products of C in Coding and Checkout Phase becomes available.

Data Element Number	Answer of Data Element	Data Element Score	Metric Score	Criteria Score	Factor Score
81					
82					
83					
138					
87					
88					
89					
90					
91					

SECOND MEASUREMENT

Date

TESTABILITY

Complete this score chart if a third application of this set of worksheets is appropriate for update when products of B-D3, B-D4 in Test and Integration Phase become available.

<u>Data Element Number</u>	<u>Answer of Data Element</u>	<u>Data Element Score</u>	<u>Metric Score</u>	<u>Criteria Score</u>	<u>Factor Score</u>
<u>81</u>					
<u>82</u>					
<u>83</u>					
<u>138</u>					
<u>87</u>					
<u>88</u>					
<u>89</u>					
<u>90</u>					
<u>91</u>					

THIRD MEASUREMENT Date _____

DESIGN STRUCTURE MEASURE

Form Code: TeDM.1

LIFE CYCLE PHASE:

IMPLEMENTATION

SOURCE(S):

☐ SYSTEM

NAME: _____

☐ SUBSYSTEM

☐ MODULE

I. DATA COLLECTION WORKSECTION:

SCORE

1.0 Entrance and Exit of the Module (83)

1.1 Number of entrances into modules. ☐

1.2 Number of exits from module. ☐

$$\text{Score} = \frac{1}{\boxed{1.1}} + \frac{1}{\boxed{1.2}}$$

☐

II. METRIC WORKSECTION:

Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the data elements above? (1-10) _____ (§ If you are unable to evaluate)

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

COMPLEXITY MEASURE

Form Code: TeDM.2

LIFE CYCLE PHASE:

IMPLEMENTATION

SOURCE(S):

- ☐ SYSTEM
☐ SUBSYSTEM
☐ MODULE

NAME: _____

I. DATA COLLECTION WORKSECTION:

SCORE

1.0 Data and Control Flow Complexity (81)

1.1 What is the sum of the number of decision points, subdecision points, conditional branches and unconditional branches?

Score = 1 + $\boxed{1.1} + 1$

II. METRIC WORKSECTION:

Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the data elements above?
(1-10) _____ (§ If you are unable to evaluate)

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

CODING SIMPLICITY MEASURE

Form Code: TeIMM.3

LIFE CYCLE PHASE:
IMPLEMENTATION

SOURCE(S):

- ☐ SYSTEM
☐ SUBSYSTEM
☐ MODULE

NAME: _____

I. DATA COLLECTION WORKSECTION:

SCORE

1.0 Negative Boolean or Compound Boolean Expressions (106)

1.1 Number of negative or complicated compound Boolean expressions. ☐

1.2 Number of lines excluding comments. ☐

Score = 1 - (☐ 1.1 + ☐ 1.2)

☐

2.0 Statement Labels (108)

2.1 Number of statement labels.
(Do not count format statements) ☐

2.2 Number of lines excluding comments.
(Executable Statements) ☐

Score = 1 - (☐ 2.1 + ☐ 2.2)

☐

3.0 Nesting Level (109)

3.1 Maximum nesting level? ☐

Score = 1 + ☐ 3.1

☐

4.0 Conditional Branches (110)

4.1 Number of conditional branches. ☐

4.2 Number of executable statements. ☐

Score = 1 - (☐ 4.1 + ☐ 4.2)

☐

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

CODING SIMPLICITY MEASURE (Continued)

Form Code: TeIMM.3

LIFE CYCLE PHASE:

IMPLEMENTATION

SOURCE(S):

☐ SYSTEM

NAME: _____

☐ SUBSYSTEM

☐ MODULE

I. DATA COLLECTION WORKSECTION (continued):

5.0 Unconditional Branches (111)

5.1 Number of unconditional branches. ☐

5.2 Number of executable statements. ☐

Score = 1 - (☐ 5.1 + ☐ 5.2)

6.0 In and Out of Loops (112)

6.1 Number of one entrance/
one exit loops. ☐

6.2 Total number of loops. ☐

Score = ☐ 6.1 + ☐ 6.2

7.0 Loop Index (113)

7.1 Number of loop indices that are
modified. ☐

7.2 Total number of loops. ☐

Score = 1 - (☐ 7.1 + ☐ 7.2)

SCORE

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

CODING SIMPLICITY MEASURE (Continued)

Form Code: TeIMM.3

LIFE CYCLE PHASE:

SOURCE(S):

IMPLEMENTATION

☐ SYSTEM

NAME: _____

☐ SUBSYSTEM

☐ MODULE

I. DATA COLLECTION WORKSECTION (continued):

SCORE

8.0 Module Flow Top to Bottom (115)

8.1 Is flow top to bottom?

☐ Y ☐ N

(There should not be any backward branching GOTOs.)

Yes = 1, No = 0

9.0 Local Variables (128)

9.1 Number of local variables.

9.2 Number of variables (local and global)

Score = 9.1 + 9.2

II. METRIC WORKSECTION:

Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the data elements above?
(1-10) _____ (0 If you are unable to evaluate)

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

MODULAR IMPLEMENTATION MEASURE

Form Code: TeIMM.4

LIFE CYCLE PHASE:

IMPLEMENTATION

SOURCE(S):

- ☐ SYSTEM
☐ SUBSYSTEM
☐ MODULE

NAME: _____

I. DATA COLLECTION WORKSECTION:

SCORE

1.0 Controlling Parameters (87)

1.1 Number of calling sequence parameters that are control variables. ☐

1.2 Number of calling sequence parameters. ☐

Score = +

2.0 Controlling Input (88)

2.1 Is input passed as calling sequence parameters? ☐ Y ☐ N

Yes = 1, No = 0

3.0 Controlling Output (89)

3.1 Is output data passed back to calling module? ☐ Y ☐ N

Yes = 1, No = 0

4.0 Controlling Return (90)

4.1 Is control returned to calling module? ☐ Y ☐ N

Yes = 1, No = 0

II. METRIC WORKSECTION:

Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the data elements above?
 (1-10) _____ (# If you are unable to evaluate)

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

QUANTITY OF COMMENTS MEASURE

Form Code: TeIMM.5

LIFE CYCLE PHASE:

IMPLEMENTATION

SOURCE(S):

☐ SYSTEM

NAME: _____

☐ SUBSYSTEM

☐ MODULE

I. DATA COLLECTION WORKSECTION:

SCORE

1.0 Quantity of Comments (117)

1.1 Number of non-blank lines of comments.

1.2 Number of non-blank lines.

Score = +

II. METRIC WORKSECTION:

Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the data elements above? (1-10) _____ (Ø If you are unable to evaluate)

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

EFFECTIVENESS OF COMMENTS MEASURE

Form Code: TeIMM,6

LIFE CYCLE PHASE:

IMPLEMENTATION

SOURCE(S):

☐ SYSTEM

NAME: _____

☐ SUBSYSTEM

☐ MODULE

I. DATA COLLECTION WORKSECTION:

SCORE

1.0 Prologue Comments (118)

1.1 Are there prologue comments containing information about the function, author, version number, date inputs, outputs, assumptions and limitations?

☐ Y ☐ N

Yes = 1, No = 0

2.0 Control and Destinations Comment (119)

2.1 How many decision points and transfers of control are not commented?

☐
☐

2.2 Total number of decision points.

Score = 1 - (☐ 2.1 + ☐ 2.2)

3.0 Machine Dependent Code Comment (120)

3.1 Is all machine language code commented?

☐ Y ☐ N

Yes = 1, No = 0

4.0 Non-standard HOL Statements Comment (121)

4.1 Are non-standard HOL statements commented?

☐ Y ☐ N

Yes = 1, No = 0

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

EFFECTIVENESS OF COMMENTS MEASURE (Continued)

Form Code: TeDM.6

LIFE CYCLE PHASE:

IMPLEMENTATION

SOURCE(S):

☐ SYSTEM

NAME: _____

☐ SUBSYSTEM

☐ MODULE

I. DATA COLLECTION WORKSECTION (continued):

SCORE

5.0 Declared Variables Commented (122)

5.1 How many declared variables are not described by comments?

5.2 Number of variables..

Score=1-(5.1 + 5.2)

6.0 Comments Which Do Not Only Repeat the Operation (124)

6.1 Do the comments do more than repeat the operation?

Y	N

Yes = 1, No = 0

7.0 Identification of Comments (137)

7.1 Are comments set off from the code in a uniform manner?

Y	N

Yes = 1, No = 0

II. METRIC WORKSECTION:

Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the data elements above? (1-10) _____ (Ø If you are unable to evaluate)

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

DESCRIPTIVENESS OF IMPLEMENTATION LANGUAGE MEASURE

Form Code: TeIMM.7

LIFE CYCLE PHASE:
IMPLEMENTATION

SOURCE(S):

- ☐ SYSTEM
☐ SUBSYSTEM
☐ MODULE

NAME: _____

I. DATA COLLECTION WORKSECTION:

SCORE

1.0 High Order Language (107)

1.1 Is high order language used?

☐ Y ☐ N

Yes = 1, No = 0

☐

2.0 Variable Names (123)

2.1 Are variable name (mnemonics)
descriptive of the physical or
functional property they represent?

☐ Y ☐ N

Yes = 1, No = 0

☐

3.0 Blocked and Indented Source Code (125)

3.1 Is the code logically blocked and
indented?

☐ Y ☐ N

Yes = 1, No = 0

☐

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

DESCRIPTIVENESS OF IMPLEMENTATION LANGUAGE MEASURE (Continued)

Form Code: TeIMM.7

LIFE CYCLE PHASE:

IMPLEMENTATION

- ☐ SYSTEM
☐ SUBSYSTEM
☐ MODULE

NAME: _____

SOURCE(S): _____

I. DATA COLLECTION WORKSECTION (continued):

SCORE

4.0 One Statement Per Line (126)

4.1 Number of lines with more than one statement. ☐

4.2 Number of continuous lines. ☐

4.3 Total number of lines in a module. ☐

$$\text{Score} = 1 - \frac{4.1 + 4.2}{4.3}$$

II. METRIC WORKSECTION:

$$\text{Metric Value} = \frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$$

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the data elements above?
 (1-10) _____ (Ø If you are unable to evaluate)

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

SIMPLICITY

Form Code: TeIMC.1

LIFE CYCLE PHASE:
IMPLEMENTATION

SOURCE(S):

TeIMM.1

TeIMM.2

- ☐ SYSTEM
☐ SUBSYSTEM
☐ MODULE

NAME: _____

TeIMM.3

I. METRIC SUMMARY WORKSECTION:

1. Design Structure Measure
2. Complexity Measure
3. Coding Simplicity Measure

SCORE

☐
☐
☐

II. CRITERIA WORKSECTION:

Criteria Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Metrics}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the metrics above?
(1-10) _____ (Ø If you are unable to evaluate)

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

MODULARITY

Form Code: TeIMC.2

LIFE CYCLE PHASE:

SOURCE(S):

IMPLEMENTATION

TeIMM.4

☐ SYSTEM

NAME: _____

☐ SUBSYSTEM

☐ MODULE

I. METRIC SUMMARY WORKSECTION:

1. Modular Implementation Measure

SCORE

☐

II. CRITERIA WORKSECTION:

Criteria Value $\frac{\text{Sum of Above Scores}}{\text{No. of Metrics}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the metrics above?
(1-10) _____ (§ If you are unable to evaluate)

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

SELF-DESCRIPTIVENESS

Form Code: TeIMC.3

LIFE CYCLE PHASE:

IMPLEMENTATION

SOURCE(S):

TeIMM.5

TeIMM.6

☐ SYSTEM

NAME: _____

☐ SUBSYSTEM

☐ MODULE

TeIMM.7

I. METRIC SUMMARY WORKSECTION:

SCORE

1. Quantity of Comments Measure
2. Effectiveness of Comments Measure
3. Descriptiveness of Implementation Language Measure

☐☐☐

II. CRITERIA WORKSECTION:

Criteria Value $\frac{\text{Sum of Above Scores}}{\text{No. of Metrics}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the metrics above?
(1-10) _____ (# If you are unable to evaluate)

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

TESTABILITY

Form Code: TeIMF.1

LIFE CYCLE PHASE:
IMPLEMENTATION

SOURCE(S):

TeIMC.1

TeIMC.2

☐ SYSTEM

NAME: _____

☐ SUBSYSTEM

☐ MODULE

TeIMC.3

I. CRITERIA SUMMARY WORKSECTION:

1. Simplicity
2. Modularity
3. Self-Descriptiveness

SCORE

☐
☐
☐

II. FACTOR WORKSECTION:

Factor Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Criteria}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the criteria above?
(1-10) _____ (Ø If you are unable to evaluate)

PREPARED BY: _____ APPROVED BY: _____

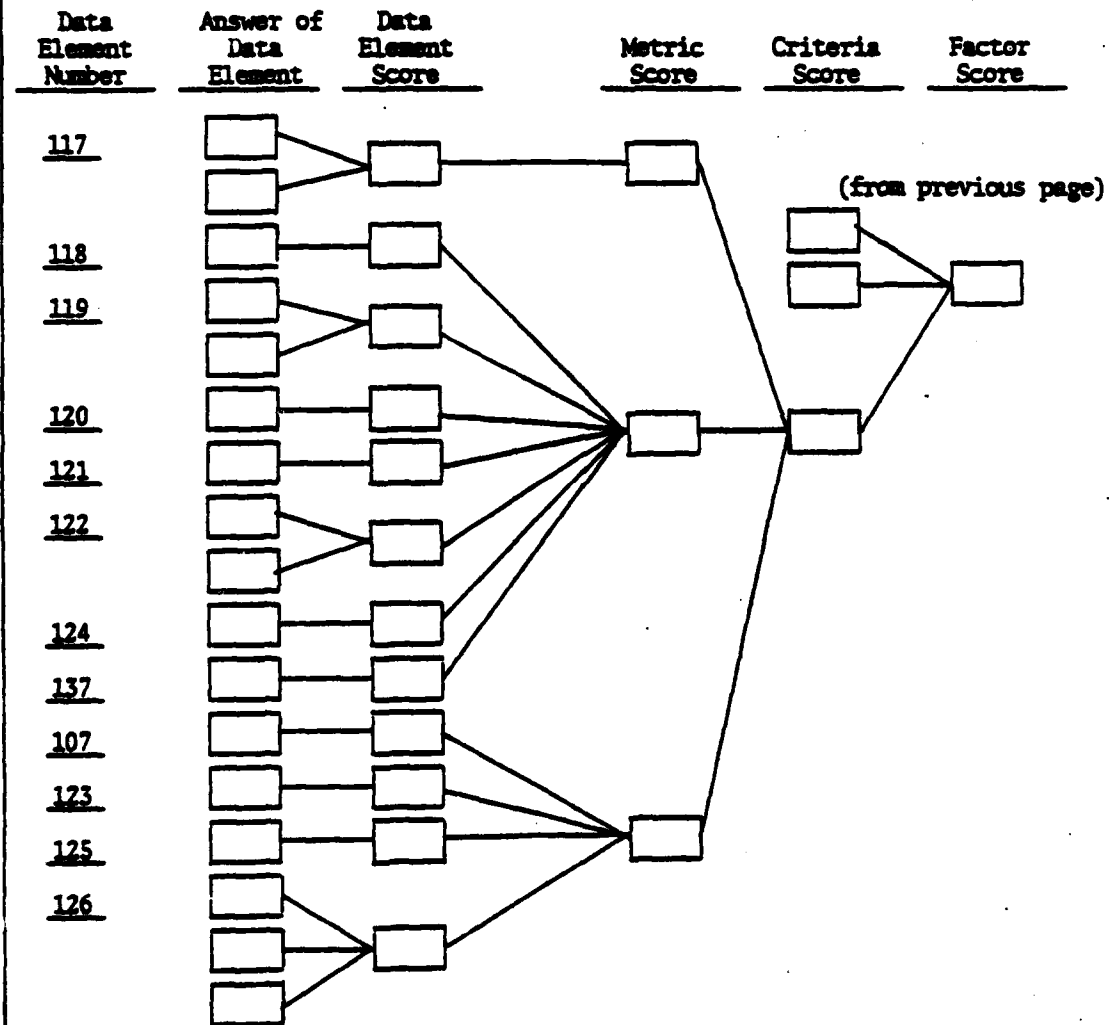
DATE: _____ DATE: _____

TESTABILITY

Complete this score chart if application of this set of worksheets is appropriate when products of A and B in Coding and Checkout Phase are available.

<u>Data Element Number</u>	<u>Answer of Data Element</u>	<u>Data Element Score</u>	<u>Metric Score</u>	<u>Criteria Score</u>	<u>Factor Score</u>
<u>83</u>					
<u>81</u>					
<u>106</u>					
<u>108</u>					
<u>109</u>					
<u>110</u>					
<u>111</u>					
<u>112</u>					
<u>113</u>					
<u>115</u>					
<u>128</u>					
<u>87</u>					
<u>88</u>					
<u>89</u>					
<u>90</u>					

TESTABILITY



FIRST MEASUREMENT

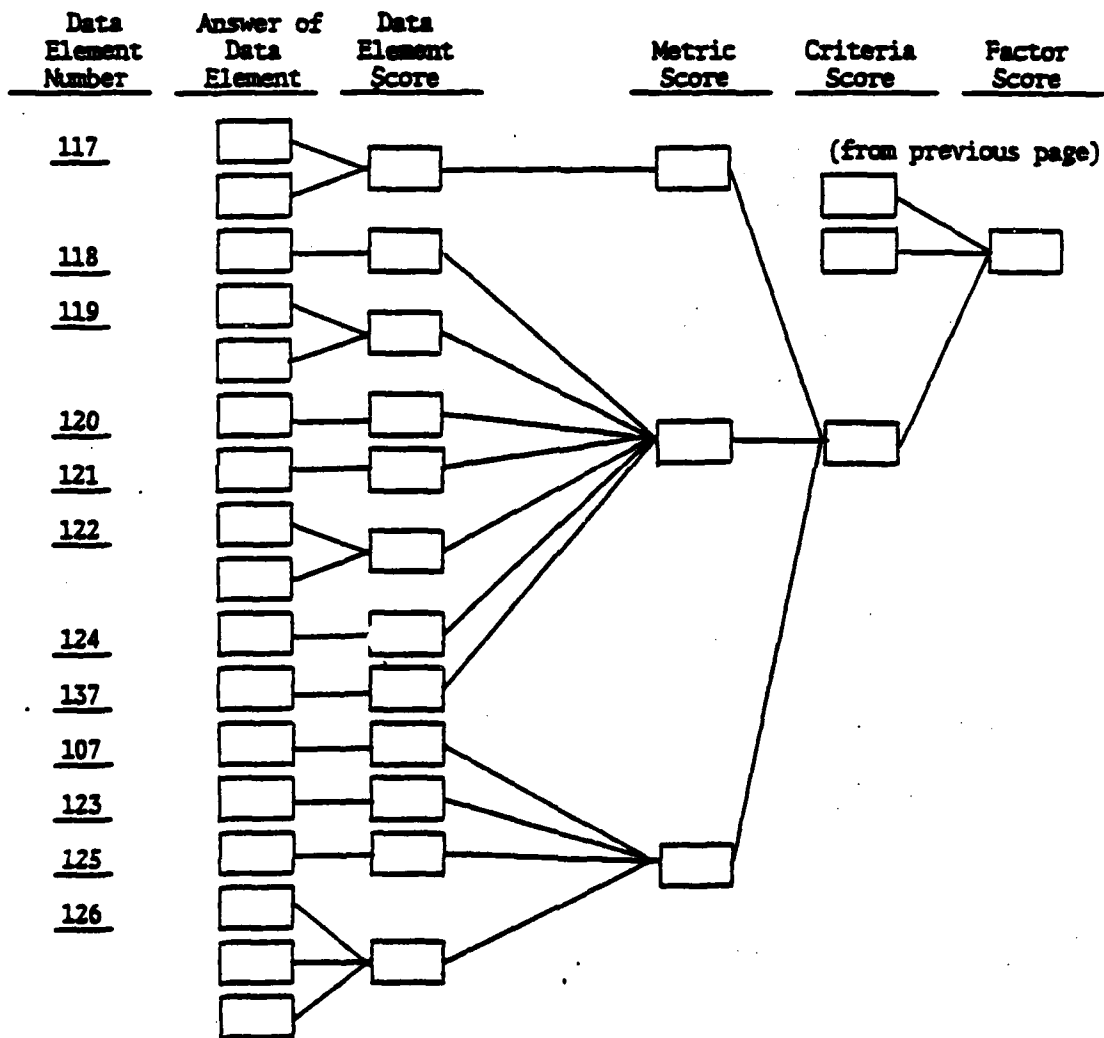
Date _____

TESTABILITY

Complete this score chart if a second application of this set of Worksheets is appropriate for update when products of B-D2 in Test and Integration Phase is available.

<u>Data Element Number</u>	<u>Answer of Data Element</u>	<u>Data Element Score</u>	<u>Metric Score</u>	<u>Criteria Score</u>	<u>Factor Score</u>
<u>83</u>					
<u>81</u>					
<u>106</u>					
<u>108</u>					
<u>109</u>					
<u>110</u>					
<u>111</u>					
<u>112</u>					
<u>113</u>					
<u>115</u>					
<u>128</u>					
<u>87</u>					
<u>88</u>					
<u>89</u>					
<u>90</u>					

TESTIBILITY



SECOND MEASUREMENT

Date _____

TESTABILITY

Complete this score chart if a second application of this set of Worksheets is appropriate for update when products of B-D2 in Test and Integration Phase is available.

<u>Data Element Number</u>	<u>Answer of Data Element</u>	<u>Data Element Score</u>	<u>Metric Score</u>	<u>Criteria Score</u>	<u>Factor Score</u>
<u>83</u>					
<u>81</u>					
<u>106</u>					
<u>108</u>					
<u>109</u>					
<u>110</u>					
<u>111</u>					
<u>112</u>					
<u>113</u>					
<u>115</u>					
<u>128</u>					
<u>87</u>					
<u>88</u>					
<u>89</u>					
<u>90</u>					

TESTIBILITY

<u>Data Element Number</u>	<u>Answer of Data Element</u>	<u>Data Element Score</u>	<u>Metric Score</u>	<u>Criteria Score</u>	<u>Factor Score</u>
<u>117</u>				(from previous page)	
<u>118</u>					
<u>119</u>					
<u>120</u>					
<u>121</u>					
<u>122</u>					
<u>124</u>					
<u>157</u>					
<u>107</u>					
<u>123</u>					
<u>125</u>					
<u>126</u>					

THIRD MEASUREMENT

Date _____

AD-A120 376

SYSTEMS ARCHITECTS INC RANDOLPH MASS
COMPUTER SYSTEMS ACQUISITION METRICS HANDBOOK. VOLUME II. QUALI--ETC(U)
MAY 82

F/G 9/2

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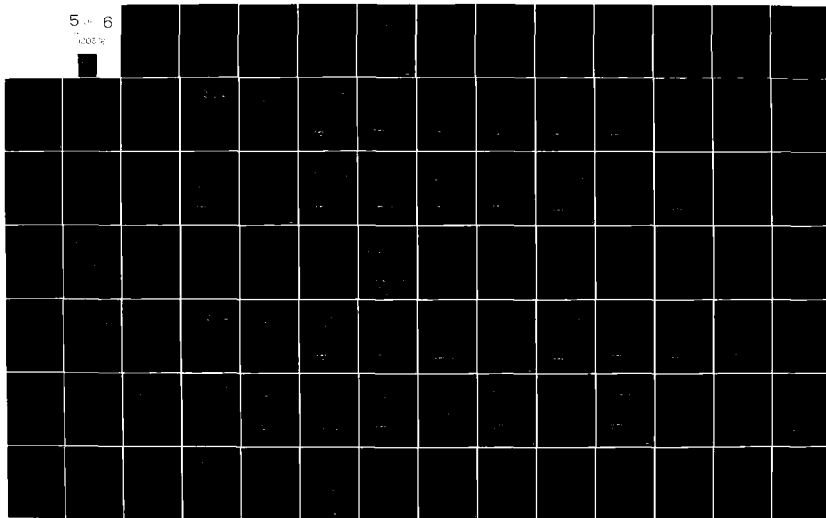
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ESD-YR-82-143(2)

5 of 6

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QUALITY FACTOR

MODULE NO. 9

PORTABILITY

TABLE OF CONTENTS

<u>TITLE</u>	<u>PAGE</u>
<u>INTRODUCTION AND INSTRUCTIONS FOR PORTABILITY MODULE</u>	
<u>INTRODUCTION TO PORTABILITY.</u>	Po-1
STEPS FOR COMPLETING WORKSHEETS	Po-4
STEPS FOR UPDATE APPLICATIONS	Po-7
HOW TO USE SCORE CHART SETS	Po-8
ESD PRODUCTS FOR ANALYSIS PHASE	Po-11
ESD PRODUCTS FOR DESIGN PHASE	Po-12
ESD PRODUCTS FOR CODING AND CHECKING PHASE. .	Po-13
ESD PRODUCTS FOR TEST AND INTEGRATION PHASE .	Po-14
 <u>QUALITY FACTOR NO. 9 PORTABILITY WORKSHEETS</u>	
WORKSHEETS FOR DETAIL DESIGN PHASE	Po-15
WORKSHEETS FOR IMPLEMENTATION PHASE.	Po-25

This QUALITY FACTOR MODULE is one of a set of eleven modules that are components of the "COMPUTER SYSTEMS ACQUISITION METRICS HANDBOOK".

INTRODUCTION AND INSTRUCTIONS
FOR
PORTABILITY MODULE

INTRODUCTION TO PORTABILITY

The Quality Factor Portability represents a measure of the effort required to transfer a program from one hardware configuration and/or software system environment to another.

FIGURES Po - 1 through Po - 4 represent the hierarchy of Metric, Criteria and Quality Factor worksheets associated with Portability in Requirements Analysis, Preliminary Design, Detailed Design and Implementation phases of the Software Development Life Cycle.

The worksheets in this module are grouped into four separate sets, one set for each Life Cycle phase. Each set consists of Metric worksheets, Criteria worksheets, a Factor worksheet and score charts.

METRIC WORKSHEETS

One or more DATA COLLECTION WORKSECTIONS which contain the data element scores for each Metric, and each Metric's Final Score.

CRITERIA WORKSHEETS

One or more METRIC SUMMARY WORKSECTIONS which contain the Metrics scores for each Criteria, and each Criteria's Final Score.

FACTOR WORKSHEETS

One CRITERIA SUMMARY WORKSECTION which contains each Criteria's score, and the Final Score for the Factor for that phase.

SCORE CHARTS:

One or more charts that record worksheet values throughout the Life Cycle.

However, the sequence in which the worksheet sets are applied is dependent on the availability of ESD Computer Program Life Cycle products. Usually the worksheets will be applied sequentially, except for updates.

These instructions show when the Portability worksheet sets and Score Charts are applied during the Computer Program Life Cycle. The Product Code referred to on the Score Charts is the code defined in the ESD Guidebook Series, Software Acquisition Management Guidebook, Life Cycle Events and reillustrated in the General Instructions. The Product Tables map the ESD Computer Program Life Cycle Products to the Metric Worksheets. The balance of these instructions are step-by-step procedures for completing the worksheets and score chart summaries.

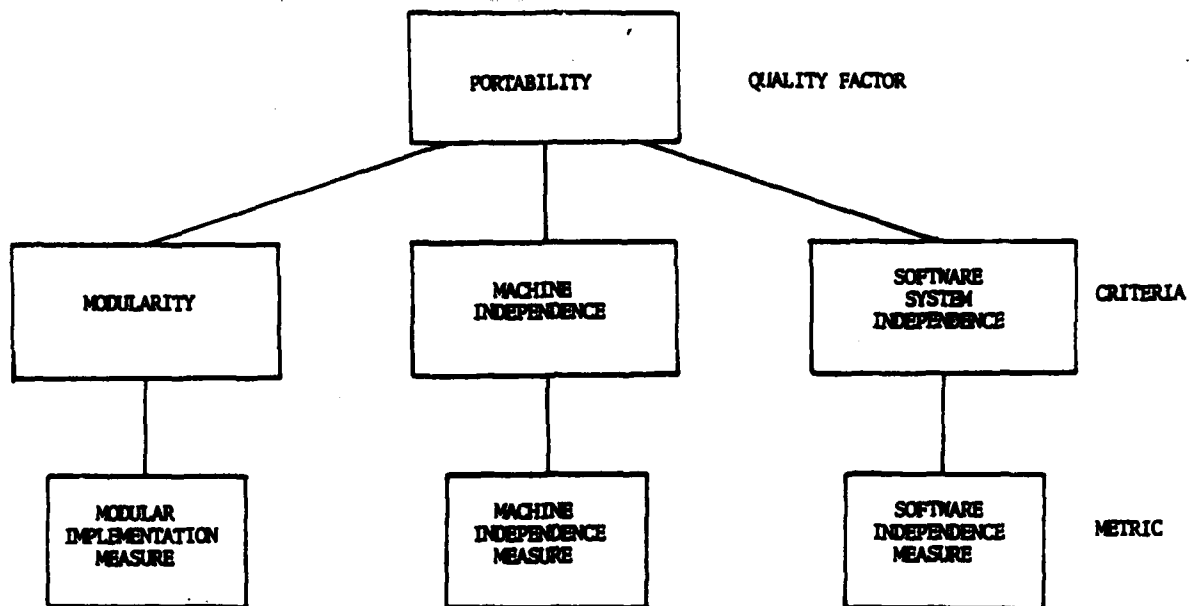


FIGURE Po-1
DETAILED DESIGN WORKSHEET HIERARCHY

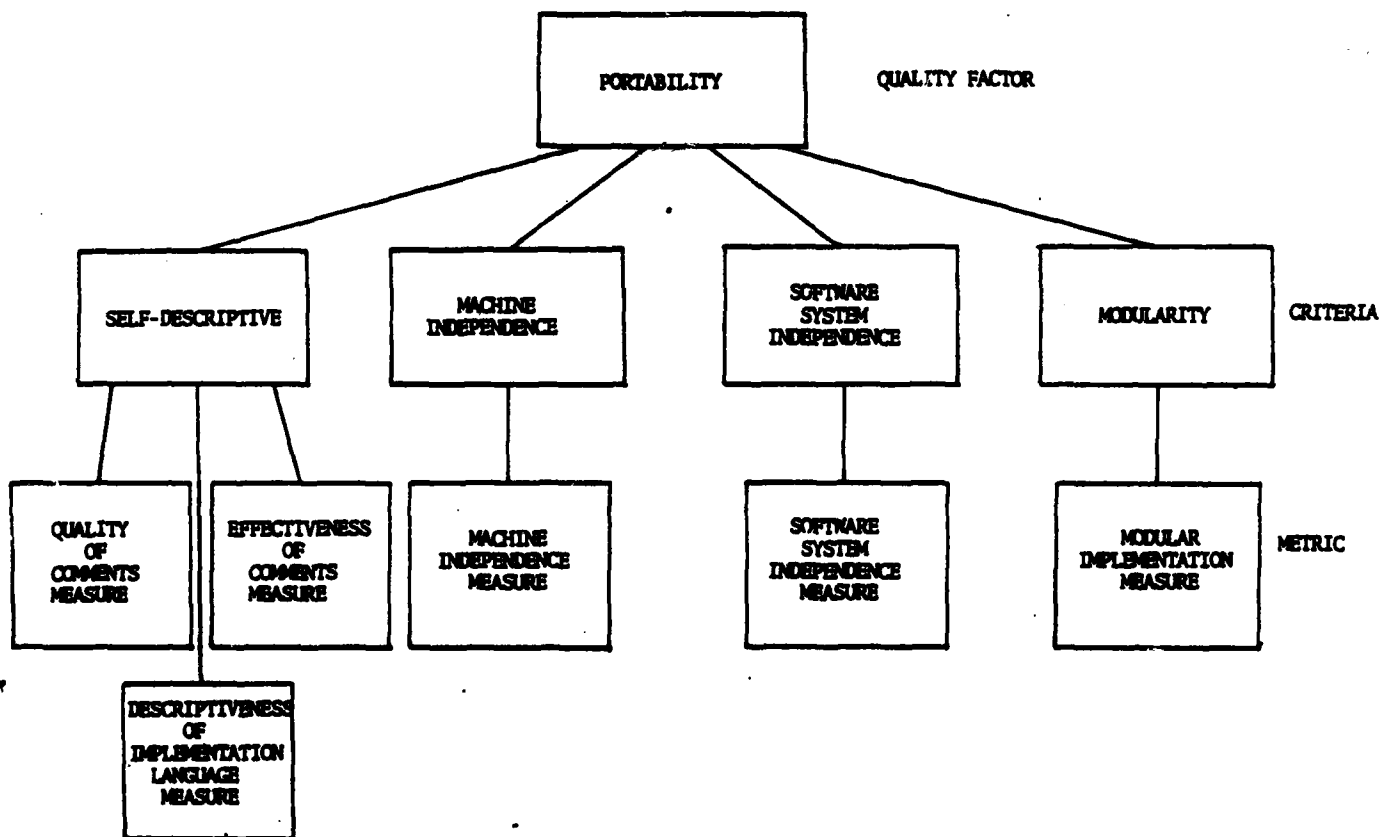


FIGURE Po-2
IMPLEMENTATION WORKSHEET HIERARCHY

STEPS FOR COMPLETING WORKSHEETS

Step 1

Enter the appropriate information in the following blocks:

- (1.1) SYSTEM/SUBSYSTEM/MODULE block-Indicate the level of application.
- (1.2) NAME block-List the name of the system being measured.
- (1.3) SOURCE block-On Metric Worksheets, list the source document.
- (1.4) The PREPARED BY and DATE blocks should contain the name of the person performing the software metrics, and the current date.

Step 2

Determine the current Computer Program Life Cycle Phase. This module is concerned with four phases of the Computer Program Life Cycle:

- (2.1) Requirements Analysis
- (2.2) Preliminary Design
- (2.3) Detail Design
- (2.4) Implementation

Step 3

Determine the available products from the phase and which data worksheet set to apply. Each Life Cycle phase has at least three different activities associated with it. The result of the completion of an activity is one or more documents called products.

Before a worksheet set can be applied, specific products associated with it must be obtained. The Product Tables, at the end of the instructions, detail the products required for each worksheet set.

Step 4 - METRIC WORKSHEETS

- (4.1) Answer each question in the Data Collection Worksection as it applies to the system/subsystem/module you are measuring and transfer its scored value to its corresponding SCORE block.

If the question calls for a YES/NO type response, a YES answer is scored at a 1.

a NO answer is scored as a 0.

The questions that call for a numeric quantity type response have specific instructions on how to score the response. Follow the instructions under each data element.

- (4.2) Find the Metric Value by following the algorithm on the worksheet.
- (4.3) Answer the Evaluation Worksection - evaluate the products based on the data elements as they apply to the system.
- (4.4) When you have repeated this procedure for all the Metric Worksheets in the set, you are ready to use the Criteria Worksheets.

Step 5 - CRITERIA WORKSHEETS

- (5.1) Each numbered item in the Metric Summary Worksection represents an individual Metric Value.

- (5.2) Find the Form Code in the SOURCE box of the Criteria Worksheet.
- (5.3) Find the Metric Worksheet with the same Form Code and transfer its Metric Value into the box to the right of the item in the Criteria Worksheet.
- (5.4) Repeat this process for all items in the Metric Summary Worksection.
- (5.5) Find the Criteria Value by following the algorithm on the worksheet.
- (5.6) Answer the Evaluation Worksection - evaluate the products based on the Metrics as they apply to the system.

Step 6 - FACTOR WORKSHEETS

- (6.1) Each numbered item in the Criteria Summary Worksection represents an individual Criterion Value.
- (6.2) Find the Form Code in the SOURCE box of the Factor Worksheet.
- (6.3) Find the Criteria Worksheet with the same Form Code and transfer its Criteria Value into the box in the Score column in the Factor Worksheet.
- (6.4) Repeat this process for all items in the Criteria Summary Worksection.
- (6.5) Answer the Evaluation Worksection - evaluate the products based on the Criteria as they apply to the system.
- (6.6) Find the Factor Value by following the algorithm on the Worksheet.

STEPS FOR UPDATE APPLICATIONS

Step 1

Determine the update necessary. The Product Tables at the end of these instructions list the updates required and the activities and products associated with each update. Also review Section 2.3.2, "Update Information Requirements", in the General Instructions Handbook for further information if necessary.

Step 2

Obtain the required products. The Products Tables at the end of these Instructions list the products required for each update application.

Step 3

Reapply the Metric, Criteria, and Factor worksheets by following the procedure already outlined in "Steps for Completing Worksheets", of these Instructions. "How to Use Score Chart sets", explains the procedure for reporting the update scores.

HOW TO USE SCORE CHART SETS

When you apply worksheets to system/subsystem/module, you must apply some worksheets more than once in the Computer Program Life Cycle. Because of this, a Score Chart set is organized so that the groups of worksheet scores, acquired at the times a set of worksheets is applied, can be recorded separately: originals & updates.

The Score Chart set (at the end of each worksheet set) is composed of similar tree structure diagrams. Each Score Chart represents the complete hierarchy of scores to be acquired during any one application of worksheets sets in the Life Cycle.

When applying any worksheet, in order to record scores you must locate and use the Score Chart that corresponds to the current phase in the Life Cycle. In a Score Chart set, the first Score Chart (labeled FIRST MEASUREMENT) is designed to receive the scores from the first application of a worksheet set in the Life Cycle, and the following charts (i.e., labeled SECOND MEASUREMENT, etc.) are designed to receive the scores from the updates.

Each data element in the Metrics Worksheet has a unique number in the Data Element Dictionary, which is listed in the first column in the Score Chart. The next two columns of boxes in a Score Chart show a worksheet set's individual data element raw scores and its interpreted response (Yes/No, = 1 or 0, etc.). The last three box columns map out the Metric, Criteria and Factor worksheets of a set, each box representing the total score of a corresponding worksheet.

Once you have finished scoring a Worksheet set and located the corresponding Score Chart set, use the following procedure for filling out the Score Chart:

Step 1 - ANSWER OF DATA ELEMENT/DATA ELEMENT SCORE

For each data element in a Metric Worksheet:

- (1.1) Reference its number in the "Data Element Number" Column in the Score Chart.
- (1.2) Transfer the answers you gave to the questions in the Data Collection Worksection to the corresponding box under the column headed "Answer of Data Element"
- (1.3) Transfer the Scores of the data element from the Data Collection Worksection to its corresponding box under column labeled "Data Element Score".
- (1.4) Repeat this step for all data elements within this phase.

Step 2 - METRIC SCORE

Each box in this column represents the Score from the Metric Worksection of a Metric Worksheet. Transfer the Metric Value from each Metric Worksheet into the corresponding boxes in the Score Chart's Metric Score Column.

Step 3 - CRITERIA SCORE

Each box in this column represents the score from the Criteria Worksection of a Criteria Worksheet into the corresponding boxes of the Score Chart's Criteria Score Column.

Step 4 - FACTOR SCORE

Each box in this column represents the score from the Factor Worksection of a Quality Factor Worksheet. Transfer the Factor from the set's Factor Worksheet into corresponding boxes of the Score Chart's Factor Score Column.

These Score Chart sets will provide a historical base for repeated application of the metrics to a system at all levels. They are also a useful means of reporting your finds to the program manager in a condensed and compact form.

PRODUCTS	TRADE-OFF STUDY REPORTS	INITIAL OR AUTHENTICATED SYSTEM SPEC, SEGMENT SPEC	AUTHENTICATED DEVELOPMENT SPEC FOR CPCI	HIGHER LEVEL SPEC	DRAFT PRODUCT SPECS	PDR MINUTES AND ACTION ITEM RESPONSES
WORKSHEET SET TO BE APPLIED	REQUIREMENTS ANALYSIS WORKSHEETS				PRELIMINARY DESIGN WORKSHEETS	

ESD PRODUCTS FOR ANALYSIS PHASE

Apply the Requirement Analysis Worksheets as the following types of products become available. See note below.

- Product A.1 - Trade-off Study Reports
- Product A.2 - Initial or Authenticated System Specification & Segment Specification (if any)
- Product B.1 - Authenticated Development Specification for each CPCI
- Product B.2 - Possible higher-level specification, ICD and changes

Apply the Preliminary Design Worksheets as the following types of products become available. See note below.

- Product B.3 - Parts of draft Product Specifications containing design approaches for each CPCI
- Product C. - PDR minutes and action item responses

NOTE: If these products do not contain the information requested by the Data Element questions, other contractor-supplied information should be searched.

PRODUCTS	FUNCTIONAL FLOW CHARTS	DE- TAILED FLOW CHART	DATA FORMAT DESC.	ALGO- RITHM DESC.	PRELIM- INARY PRODUCT DESC.	CDR MINUTES ACTION ITEM RESPON- SES	SYSTEM SEG- MENT TEST PLANS	PRELIM. CPCI TEST PRO- CEDURES
WORKSHEET SET TO BE APPLIED	DETAILED DESIGN WORKSHEETS						PRELIMINARY DESIGN WORKSHEETS, (UPDATE)	

ESD PRODUCTS FOR DESIGN PHASE

Apply the Detailed Design Worksheets as the following types of products become available. See note below.

- Product A.1: Functional flowcharts
- Product A.2: Detailed flowcharts
- Product A.3: Data format descriptions
- Product A.4: Descriptions of algorithms not previously prescribed
- Product B. : Preliminary Product Specifications, including the above
- Product D. : CDR minutes & action item responses

Apply the Preliminary Design Worksheets for Update as the following types of products become available. See note.

- Product C.1: System, Segment and CPCI Test Plans
- Product C.2: Preliminary CPCI Test Procedures

NOTE: If these products do not contain the information requested by the Data Element questions, other contractor-supplied information should be searched.

PRODUCTS	CODE	ALTERED PRODUCT SPECS
WORKSHEET SET TO BE APPLIED	IMPLEMENTATION WORKSHEETS	DETAILED DESIGN WORKSHEETS (UPDATE)

ESD PRODUCTS FOR CODING AND CHECKING PHASE

Apply the Implementation Worksheets as the code becomes available.

Apply the Detailed Design Worksheets for Update as the following types of products become available. See note below.

- Product C. - Altered Product Specifications, including compiler/assembly listings.

NOTE: If these products do not contain the information requested by the Data Element questions, other contractor-supplied information should be searched.

PRODUCTS	FINAL CPCI TEST PROCEDURES	SEGMENT & SYSTEM LEVEL TEST PROCEDURES	TEST REPORTS	CODING CHANGES	MODIFIED PRODUCT SPECS	HIGH LEVEL SPECS
WORKSHEET SET TO BE APPLIED	PRELIMINARY DESIGN WORKSHEETS			IMPLEMEN- TATION WORKSHEETS	DETAILED DESIGN WORKSHEETS (UPDATE)	

ESD PRODUCTS FOR TEST AND
INTEGRATION PHASE

Apply the Preliminary Design Worksheets for Update as the following types of products become available. See note below.

- A Product 1: Final CPCI Test Procedures
- Product 2: Segment (if any) and system-level Test Procedures

- B-D Product 1: Test Reports

Apply the Implementation Worksheets for Update as the following types of products become available. See note below.

- B-D Product 2: Computer Program Coding Changes

Apply the Detailed Design Worksheets for Update as the following types of products become available. See note.

- B-D Product 3: Modified Product Specification
- Product 4: Possible high-level specification, ICD and changes.

NOTE: If these products do not contain the information requested by the Data Element questions, other contractor-supplied information should be searched.

MODULAR IMPLEMENTATION MEASURE

Form Code: PoDDM.1

LIFE CYCLE PHASE:

DETAIL DESIGN

SOURCE(S):

☐ SYSTEM

NAME: _____

☐ SUBSYSTEM

☐ MODULE

I. DATA COLLECTION WORKSECTION:

SCORE

1.0 Controlling Parameters(87)

1.1 Number of calling sequence parameters that are control variables. ☐

1.2 Number of calling sequence parameters. ☐

Score = 1.1 -- 1.2

2.0 Controlling Input (88)

2.1 Is input passed as calling sequence parameters? ☐ Y ☐ N

Yes = 1, No = 0

3.0 Controlling Output (89)

3.1 Is output data passed back to calling module? ☐ Y ☐ N

Yes = 1, No = 0

4.0 Controlling Return (90)

4.1 Is control returned to calling module? ☐ Y ☐ N

Yes = 1, No = 0

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

MODULAR IMPLEMENTATION MEASURE (Continued)

Form Code: PoDDM.1

LIFE CYCLE PHASE:

DETAIL DESIGN

- ☐ SYSTEM
☐ SUBSYSTEM
☐ MODULE

NAME: _____

SOURCE(S):

I. DATA COLLECTION WORKSECTION (continued):

SCORE

5.0 Share Temporary Storage (91)

5.1 Is temporary storage independent of other modules?

Y N

Yes = 1, No = 0

☐

II. METRIC WORKSECTION:

Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$

☐

**III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the data elements above?
 (1-10) _____ (# If you are unable to evaluate)**

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

MACHINE INDEPENDENCE MEASURE

Form Code: PODDM.2

LIFE CYCLE PHASE:

DETAIL DESIGN

SOURCE(S):

☐ SYSTEM

NAME: _____

☐ SUBSYSTEM

☐ MODULE

I. DATA COLLECTION WORKSECTION:

SCORE

1.0 Programming Language Availability (97)

1.1 Is the programming language available in other machines?

☐ Y ☐ N

Yes = 1, No = 0

☐

II. METRIC WORKSECTION:

Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the data elements above?
(1-10) _____ (Ø If you are unable to evaluate)

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

SOFTWARE SYSTEM INDEPENDENCE MEASURE

Form Code: PODIM.3

LIFE CYCLE PHASE:

SOURCE(S):

DETAIL DESIGN

- ☐ SYSTEM
☐ SUBSYSTEM
☐ MODULE

NAME: _____

I. DATA COLLECTION WORKSECTION:

SCORE

1.0 Dependence on Software System Utility Programs (85)

1.1 Number of references to system
library routines, utilities, or
other system provided facilities
or functions. ☐

1.2 Number of total lines of code. ☐

Score = 1 - (☐ 1.1 ÷ ☐ 1.2)

2.0 Standard Language Used (96)

2.1 Is a common standard subset of a
programming language to be used? ☐ Y ☐ N

Yes = 1, No = 0

II. METRIC WORKSECTION:

Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$

III. EVALUATION WORKSECTION: What is your evaluation of the
reviewed products based on the data elements above?
(1-10) _____ (Ø If you are unable to evaluate)

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

<u>MODULARITY</u>		Form Code: <u>PoDDC.1</u>
LIFE CYCLE PHASE: DETAIL DESIGN		SOURCE(S): <u>PoDDM.1</u>
☐ SYSTEM ☐ SUBSYSTEM ☐ MODULE	NAME: _____ _____ _____	
I. <u>METRIC SUMMARY WORKSECTION:</u> 1. Modular Implementation Measure		SCORE
II. <u>CRITERIA WORKSECTION:</u> $\text{Criteria Value} = \frac{\text{Sum of Above Score}}{\text{No. of Metrics}}$		
III. <u>EVALUATION WORKSECTION:</u> What is your evaluation of the reviewed products based on the metrics above? (1-10) _____ (§ If you are unable to evaluate)		

PREPARED BY: _____ APPROVED BY: _____
 DATE: _____ DATE: _____

MACHINE INDEPENDENCE

Form Code: PoDDC.2

LIFE CYCLE PHASE:
DETAIL DESIGN

SOURCE(S):
PoDDM.2

- ☐ SYSTEM
☐ SUBSYSTEM
☐ MODULE

NAME: _____

I. METRIC SUMMARY WORKSECTION:

1. Machine Independence Measure

SCORE

☐

II. CRITERIA WORKSECTION:

Criteria Value $\frac{\text{Sum of Above Scores}}{\text{No. of Metrics}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the metrics above?
(1-10) _____ (§ If you are unable to evaluate)

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

SOFTWARE SYSTEM INDEP.

Form Code: PoDDC.3

LIFE CYCLE PHASE:

DETAIL DESIGN

SOURCE(S):

PoDDM.3

☐ SYSTEM

NAME: _____

☐ SUBSYSTEM

☐ MODULE

I. METRIC SUMMARY WORKSECTION:

1. Software System Independence Measure

SCORE

☐

II. CRITERIA WORKSECTION:

Criteria Value = $\frac{\text{Sum of Above Score}}{\text{No. of Metrics}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the metrics above?
(1-10) _____ (Ø If you are unable to evaluate)

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

<u>PORTABILITY</u>		
		Form Code: <u>PoDDF.1</u>
LIFE CYCLE PHASE: DETAIL DESIGN		SOURCE(S): <u>PoDDC.1</u> <u>PoDDC.2</u> <u>PoDDC.3</u>
☐ SYSTEM ☐ SUBSYSTEM ☐ MODULE	NAME: _____ _____ _____	
I. <u>CRITERIA SUMMARY WORKSECTION:</u> 1. Modularity 2. Machine Independence 3. Software System Independence		<u>SCORE</u> ☐ ☐ ☐
II. <u>FACTOR WORKSECTION:</u> $\text{Factor Value} = \frac{\text{Sum of Above Scores}}{\text{No. of Criteria}}$		☐
III. <u>EVALUATION WORKSECTION:</u> What is your evaluation of the reviewed products based on the criteria above? (1-10) _____ (Ø If you are unable to evaluate)		

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

PORTABILITY

Complete this score chart if application of this set of Worksheets is appropriate when products of A1, A2, A3, A4, B and D in Design Phase are available.

Data Element Number	Answer of Data Element	Data Element Score	Metric Score	Criteria Score	Factor Score
<u>87</u>					
<u>88</u>					
<u>89</u>					
<u>90</u>					
<u>91</u>					
<u>97</u>					
<u>85</u>					
<u>96</u>					

FIRST MEASUREMENT

Date _____

Complete this score chart if application of this set of worksheets is appropriate when products of C in Coding and Checkout phase is available.

Data Element Number	Answer of Data Element	Data Element Score	Metric Score	Criteria Score	Factor Score
<u>87</u>					
<u>88</u>					
<u>89</u>					
<u>90</u>					
<u>91</u>					
<u>97</u>					
<u>85</u>					
<u>96</u>					

SECOND MEASUREMENT

Date _____

PORTABILITY

Complete this score chart if application of this set of worksheets is appropriate when products of B-D4 in Test and Integration Phase is available.

<u>Data Element Number</u>	<u>Answer of Data Element</u>	<u>Data Element Score</u>	<u>Metric Score</u>	<u>Criteria Score</u>	<u>Factor Score</u>
<u>87</u>					
<u>88</u>					
<u>89</u>					
<u>90</u>					
<u>91</u>					
<u>97</u>					
<u>85</u>					
<u>96</u>					

THIRD MEASUREMENT

Date _____

MODULAR IMPLEMENTATION MEASURE

Form Code: PoIMM.1

LIFE CYCLE PHASE:

IMPLEMENTATION

SOURCE(S):

- ☐ SYSTEM
☐ SUBSYSTEM
☐ MODULE

NAME: _____

I. DATA COLLECTION WORKSECTION:

SCORE

1.0 Controlling Parameters (87)

1.1 Number of calling sequence parameters that are control variables. ☐

1.2 Number of calling sequence parameters. ☐

Score = ☐ 1.1 + ☐ 1.2 ☐

2.0 Controlling Input (88)

2.1 Is input passed as calling sequence parameters? ☐ Y ☐ N

Yes = 1, No = 0 ☐

3.0 Controlling Output (89)

3.1 Is output data passed back to calling module? ☐ Y ☐ N

Yes = 1, No = 0 ☐

4.0 Controlling Return (90)

4.1 Is control returned to calling module? ☐ Y ☐ N

Yes = 1, No = 0 ☐

II. METRIC WORKSECTION:

Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$ ☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the data elements above? (1-10) (Ø If you are unable to evaluate)

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

QUANTITY OF COMMENTS MEASURE

Form Code: PoIM.2

LIFE CYCLE PHASE:
IMPLEMENTATION

SOURCE(S):

- ☐ SYSTEM
☐ SUBSYSTEM
☐ MODULE

NAME: _____

I. DATA COLLECTION WORKSECTION:

SCORE

1.0 Quantity of Comments (117)

1.1 Number of non-blank lines of comments.

1.2 Number of non-blank lines.

Score = +

II. METRIC WORKSECTION:

Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the data elements above?
(1-10) _____ (Ø If you are unable to evaluate)

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

EFFECTIVENESS OF COMMENTS MEASURE

Form Code: PoIMM.3

LIFE CYCLE PHASE:

IMPLEMENTATION

SOURCE(S):

☐ SYSTEM

NAME: _____

☐ SUBSYSTEM

☐ MODULE

I. DATA COLLECTION WORKSECTION:

SCORE

1.0 Prologue Comments (118)

1.1 Are there prologue comments containing information about the function, author, version number, date inputs, outputs, assumptions and limitations?

☐ Y ☐ N

Yes = 1, No = 0

2.0 Control and Destinations Comment (119)

2.1 How many decision points and transfers of control are not commented?

☐
☐

2.2 Total number of decision points.

Score=1-(☐ 2.1 + ☐ 2.2)

3.0 Machine dependent Code Comment (120)

3.1 Is all machine language code commented?

☐

Yes = 1, No = 0

4.0 Non-standard HDL Statements Comment (121)

4.1 Are non-standard HDL statements commented?

☐

Yes = 1, No = 0

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

EFFECTIVENESS OF COMMENTS MEASURE (Continued)

Form Code: PoIMM.3

LIFE CYCLE PHASE:

IMPLEMENTATION

☐

SYSTEM

NAME: _____

☐

SUBSYSTEM

☐

MODULE

SOURCE(S):

I. DATA COLLECTION WORKSECTION (continued):

SCORE

5.0 Declared Variables Commented (122)

5.1 How many declared variables are not described by comments?

5.2 Number of variables.

Score = 1 - (5.1 + 5.2)

6.0 Comments Which Do Not Only Repeat the Operation (124)

6.1 Do the comments do more than repeat the operation? Y N

Yes = 1, No = 0

7.0 Identification of Comments (137)

7.1 Are comments set off from the code in a uniform manner? Y N

Yes = 1, No = 0

II. METRIC WORKSECTION:

Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the data elements above?
(1-10) _____ (§ If you are unable to evaluate)

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

DESCRIPTIVENESS OF IMPLEMENTATION LANGUAGE MEASURE

Form Code: PoIMM.4

LIFE CYCLE PHASE:

IMPLEMENTATION

SOURCE(S):

☐ SYSTEM

NAME: _____

☐ SUBSYSTEM

☐ MODULE

I. DATA COLLECTION WORKSECTION:

SCORE

1.0 High Order Language (107)

1.1 Is high order language needed? ☐ Y ☐ N

Yes = 1, No = 0

2.0 Variable Names (123)

2.1 Are variable name (mnemonics) descriptive of the physical or functional property they represent? ☐ Y ☐ N

Yes = 1, No = 0

3.0 Blocked and Indented Source Code (125)

3.1 Is the code logically blocked and indented? ☐ Y ☐ N

Yes = 1, No = 0

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

DESCRIPTIVENESS OF IMPLEMENTATION LANGUAGE MEASURE (Continued)

Form Code: PoIMM.4

LIFE CYCLE PHASE:

IMPLEMENTATION

- ☐ SYSTEM
☐ SUBSYSTEM
☐ MODULE

NAME: _____

SOURCE(S):

I. DATA COLLECTION WORKSECTION (continued):

SCORE

4.0 One Statement Per Line (126)

4.1 Number of lines with more than one statement. ☐

4.2 Number of continued lines. ☐

4.3 The total number of lines in a module. ☐

Score = 1 - $\frac{4.1}{4.3} + \frac{4.2}{4.3}$

☐

II. METRIC WORKSECTION:

Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the data elements above?
 (1-10) _____ (0 If you are unable to evaluate)

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

MACHINE INDEPENDENCE MEASURE

Form Code: PoIMM.5

LIFE CYCLE PHASE:

IMPLEMENTATION

SOURCE(S):

- ☐ SYSTEM
☐ SUBSYSTEM
☐ MODULE

NAME: _____

I. DATA COLLECTION WORKSECTION:

SCORE

1.0 Data Representation Machine Independent (132)

1.1 Is data representation machine independent?

☐ Y ☐ N

Yes = 1, No = 0

☐

II. METRIC WORKSECTION:

Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the data elements above?
(1-10) _____ (# If you are unable to evaluate)

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

SOFTWARE SYSTEM INDEPENDENCE MEASURE

Form Code: POIMM.6

LIFE CYCLE PHASE:

IMPLEMENTATION

SOURCE(S):

☐ SYSTEM

NAME: _____

☐ SUBSYSTEM

☐ MODULE

I. DATA COLLECTION WORKSECTION:

SCORE

1.0 Dependence on Software System Utility Programs (85)

1.1 Number of references to system library routines, utilities, or other system provided facilities or functions.

1.2 Number of total lines of code.

Score=1-(1.1 + 1.2)

II. METRIC WORKSECTION:

Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the data elements above?
(1-10) _____ (§ If you are unable to evaluate)

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

<u>MODULARITY</u>		
		Form Code: <u>PoIMC.1</u>
LIFE CYCLE PHASE: IMPLEMENTATION		SOURCE(S): <u>PoIMM.1</u>
☐ SYSTEM ☐ SUBSYSTEM ☐ MODULE	NAME: _____ _____ _____	
I. <u>METRIC SUMMARY WORKSECTION:</u> 1. Modular Implementation Measure		SCORE
II. <u>CRITERIA WORKSECTION:</u> Criteria Value $\frac{\text{Sum of Above Scores}}{\text{No. of Metrics}}$		
III. <u>EVALUATION WORKSECTION:</u> What is your evaluation of the reviewed products based on the metrics above? (1-10) _____ (Ø If you are unable to evaluate)		

PREPARED BY: _____ APPROVED BY: _____
 DATE: _____ DATE: _____

SELF-DESCRIPTIVENESS

Form Code: PoIMC.2

LIFE CYCLE PHASE:

IMPLEMENTATION

- ☐ SYSTEM
☐ SUBSYSTEM
☐ MODULE

NAME: _____

SOURCE(S):

PoIMM.2

PoIMM.3

PoIMM.4

I. METRIC SUMMARY WORKSECTION:

1. Quantity of Comments Measure
2. Effectiveness of Comments Measure
3. Descriptiveness of Implementation Language Measure

SCORE

☐☐☐

II. CRITERIA WORKSECTION:

Criteria Value $\frac{\text{Sum of Above Scores}}{\text{No. of Metrics}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the metrics above?
(1-10) _____ (0 If you are unable to evaluate)

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

MACHINE INDEPENDENCE

Form Code: PoIMC.3

LIFE CYCLE PHASE:

IMPLEMENTATION

SOURCE(S):

PoIMM.5

☐

SYSTEM

NAME: _____

☐

SUBSYSTEM

☐

MODULE

I. METRIC SUMMARY WORKSECTION:

1. Machine Independence Measure

SCORE

☐

II. CRITERIA WORKSECTION:

Criteria Value $\frac{\text{Sum of Above Scores}}{\text{No. of Metrics}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the metrics above?
(1-10) _____ (Ø If you are unable to evaluate)

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

SOFTWARE SYSTEM INDEPENDENCE

Form Code: PoIMC.4

LIFE CYCLE PHASE:

IMPLEMENTATION

SOURCE(S):

PoIMM.6

☐

SYSTEM

NAME: _____

☐

SUBSYSTEM

☐

MODULE

I. METRIC SUMMARY WORKSECTION:

1. Software System Independence Measure

SCORE

☐

II. CRITERIA WORKSECTION:

Criteria Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Metrics}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the metrics above?
(1-10) _____ (# If you are unable to evaluate)

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

<u>PORTABILITY</u>			
		Form Code: <u>PoIMF.1</u>	
LIFE CYCLE PHASE:		SOURCE(S):	
<u>IMPLEMENTATION</u>		<u>PoIMC.1</u>	<u>PoIMC.2</u>
☐ SYSTEM ☐ SUBSYSTEM ☐ MODULE	NAME: _____ _____ _____	<u>PoIMC.3</u>	<u>PoIMC.4</u>
I. <u>CRITERIA SUMMARY WORKSECTION:</u> 1. Modularity 2. Self-Descriptiveness 3. Machine Independence 4. Software System Independence			SCORE ☐ ☐ ☐ ☐
II. <u>FACTOR WORKSECTION:</u> Factor Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Criteria}}$			☐
III. <u>EVALUATION WORKSECTION:</u> What is your evaluation of the reviewed products based on the criteria above? (1-10) _____ (§ If you are unable to evaluate)			

PREPARED BY: _____ APPROVED BY: _____
 DATE: _____ DATE: _____

PORTABILITY

Complete this score chart if application of this set of worksheets is appropriate when products of A and B in Coding and Checkout Phase are available.

<u>Data Element Number</u>	<u>Answer of Data Element</u>	<u>Data Element Score</u>	<u>Metric Score</u>	<u>Criteria Score</u>	<u>Factor Score</u>
<u>87</u>					
<u>88</u>					
<u>89</u>					
<u>90</u>					
<u>117</u>					
<u>118</u>					
<u>119</u>					
<u>120</u>					
<u>121</u>					
<u>122</u>					
<u>124</u>					
<u>137</u>					
<u>107</u>					
<u>123</u>					
<u>125</u>					
<u>126</u>					
<u>132</u>					
<u>85</u>					

FIRST MEASUREMENT

Date _____

PORTABILITY

Complete this score chart if application of this set of worksheets is appropriate when products of B-D2 in Test and Integration Phase is available.

<u>Data Element Number</u>	<u>Answer of Data Element</u>	<u>Data Element Score</u>	<u>Metric Score</u>	<u>Criteria Score</u>	<u>Factor Score</u>
<u>87</u>					
<u>88</u>					
<u>89</u>					
<u>90</u>					
<u>117</u>					
<u>118</u>					
<u>119</u>					
<u>120</u>					
<u>121</u>					
<u>122</u>					
<u>124</u>					
<u>137</u>					
<u>107</u>					
<u>123</u>					
<u>125</u>					
<u>126</u>					
<u>132</u>					
<u>85</u>					

SECOND MEASUREMENT

Date

PORTABILITY

Complete this score chart if application of this set of worksheets is appropriate when products of B-D2 in Test and Integration Phase is available.

<u>Data Element Number</u>	<u>Answer of Data Element</u>	<u>Data Element Score</u>	<u>Metric Score</u>	<u>Criteria Score</u>	<u>Factor Score</u>
<u>87</u>					
<u>88</u>					
<u>89</u>					
<u>90</u>					
<u>117</u>					
<u>118</u>					
<u>119</u>					
<u>120</u>					
<u>121</u>					
<u>122</u>					
<u>124</u>					
<u>137</u>					
<u>107</u>					
<u>123</u>					
<u>125</u>					
<u>126</u>					
<u>132</u>					
<u>85</u>					

THIRD MEASUREMENT

Date

QUALITY FACTOR

MODULE NO. 10

REUSABILITY

TABLE OF CONTENTS

<u>TITLE</u>	<u>PAGE</u>
<u>INTRODUCTION AND INSTRUCTIONS FOR REUSABILITY MODULE</u>	
INTRODUCTION TO REUSABILITY.	Ru-1
STEPS FOR COMPLETING WORKSHEETS	Ru-4
STEPS FOR UPDATE APPLICATIONS	Ru-7
HOW TO USE SCORE CHART SETS	Ru-8
ESD PRODUCTS FOR ANALYSIS PHASE	Ru-11
ESD PRODUCTS FOR DESIGN PHASE	Ru-12
ESD PRODUCTS FOR CODING AND CHECKING PHASE. .	Ru-13
ESD PRODUCTS FOR TEST AND INTEGRATION PHASE .	Ru-14
 <u>QUALITY FACTOR NO. 10 REUSABILITY WORKSHEETS</u>	
WORKSHEETS FOR DETAIL DESIGN PHASE	Ru-15
WORKSHEETS FOR IMPLEMENTATION PHASE.	Ru-28

This QUALITY FACTOR MODULE is one of a set of eleven modules that are components of the "COMPUTER SYSTEMS ACQUISITION METRICS HANDBOOK".

INTRODUCTION AND INSTRUCTIONS
FOR
REUSABILITY MODULE

INTRODUCTION TO REUSABILITY

The Quality Factor Reusability represents a measure of the extent to which a program can be used in other applications - related to the packaging and scope of the functions that programs perform. FIGURES Ru - 1 through Ru - 4 represent the hierarchy of Metric, Criteria and Quality Factor worksheets associated with Reusability in Requirements Analysis, Preliminary Design, Detailed Design and Implementation phases of the Software Development Life Cycle.

The worksheets in this module are grouped into four separate sets, one set for each Life Cycle phase. Each set consists of Metric worksheets, Criteria worksheets, a Factor worksheet and score charts.

METRIC WORKSHEETS

One or more DATA COLLECTION WORKSECTIONS which contain the data element scores for each Metric, and each Metric's Final Score.

CRITERIA WORKSHEETS

One or more METRIC SUMMARY WORKSECTIONS which contain the Metrics scores for each Criteria, and each Criteria's Final Score.

FACTOR WORKSHEETS

One CRITERIA SUMMARY WORKSECTION which contains each Criteria's score, and the Final Score for the Factor for that phase.

SCORE CHARTS:

One or more charts that record worksheet values throughout the Life Cycle.

However, the sequence in which the worksheet sets are applied is dependent on the availability of ESD Computer Program Life Cycle products. Usually the worksheets will be applied sequentially, except for updates.

These instructions show when the Reusability worksheet sets and Score Charts are applied during the Computer Program Life Cycle. The Product Code referred to on the Score Charts is the code defined in the ESD Guidebook Series, Software Acquisition Management Guidebook, Life Cycle Events and reillustrated in the General Instructions. The Product Tables map the ESD Computer Program Life Cycle Products to the Metric Worksheets. The balance of these instructions are step-by-step procedures for completing the worksheets and score chart summaries.

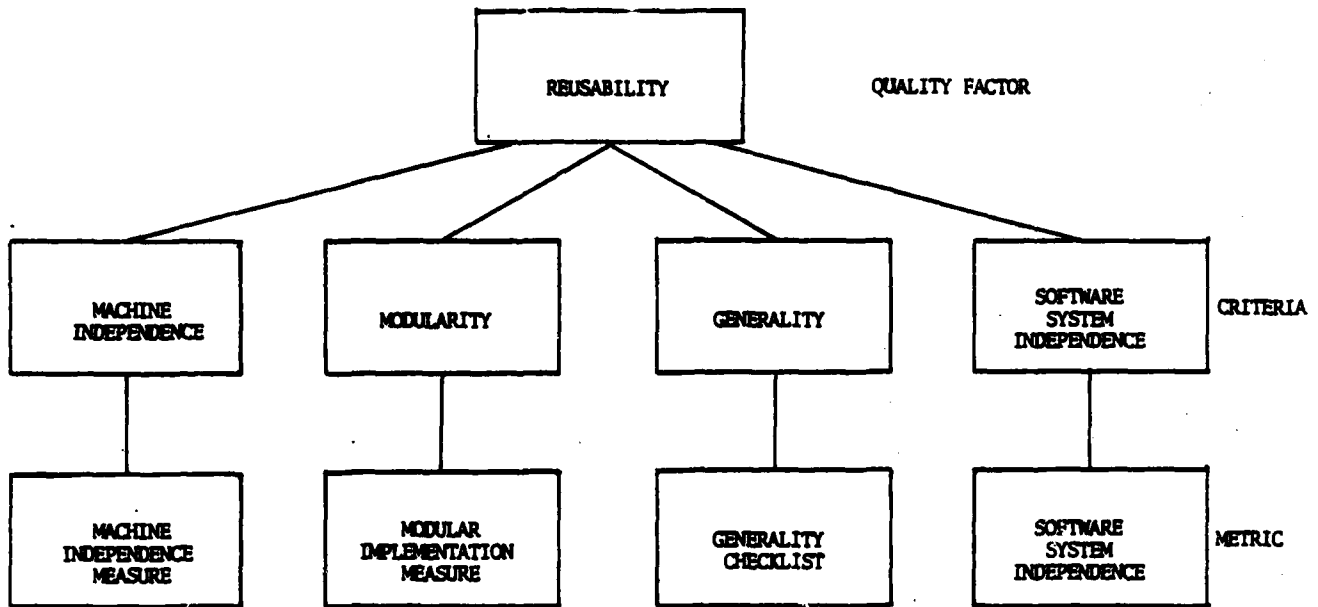


FIGURE Ru-1
DETAILED DESIGN WORKSHEET HIERARCHY

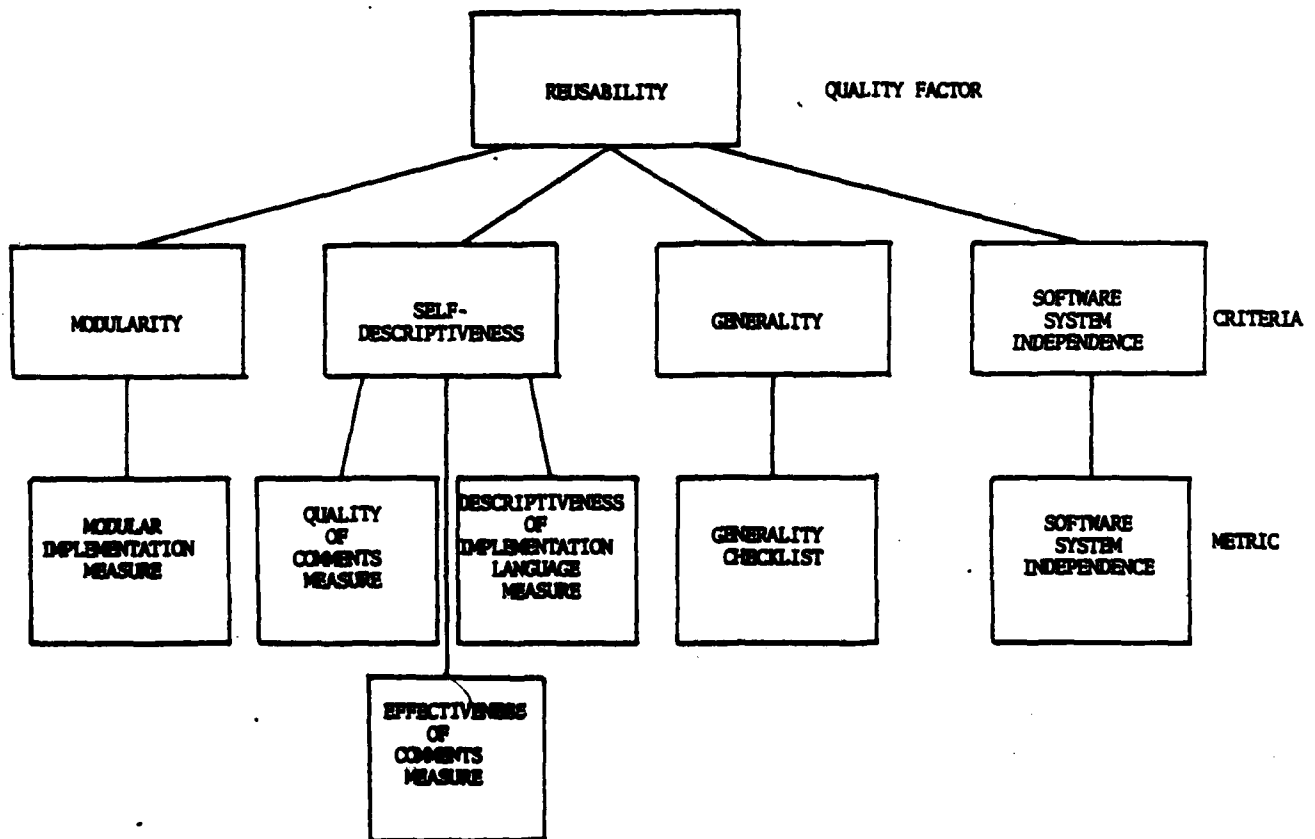


FIGURE Ru-2
IMPLEMENTATION WORKSHEET HIERARCHY

STEPS FOR COMPLETING WORKSHEETS

Step 1

Enter the appropriate information in the following blocks:

- (1.1) SYSTEM/SUBSYSTEM/MODULE block-Indicate the level of application.
- (1.2) NAME block-List the name of the system being measured.
- (1.3) SOURCE block-On Metric Worksheets, list the source document.
- (1.4) The PREPARED BY and DATE blocks should contain the name of the person performing the software metrics, and the current date.

Step 2

Determine the current Computer Program Life Cycle Phase. This module is concerned with four phases of the Computer Program Life Cycle:

- (2.1) Requirements Analysis
- (2.2) Preliminary Design
- (2.3) Detail Design
- (2.4) Implementation

Step 3

Determine the available products from the phase and which data worksheet set to apply. Each Life Cycle phase has at least three different activities associated with it. The result of the completion of an activity is one or more documents called products.

Before a worksheet set can be applied, specific products associated with it must be obtained. The Product Tables, at the end of the instructions, detail the products required for each worksheet set.

Step 4 - METRIC WORKSHEETS

- (4.1) Answer each question in the Data Collection Worksection as it applies to the system/subsystem/module you are measuring and transfer its scored value to its corresponding SCORE block.

If the question calls for a YES/NO type response, a YES answer is scored at a 1.
a NO answer is scored as a 0.

The questions that call for a numeric quantity type response have specific instructions on how to score the response. Follow the instructions under each data element.

- (4.2) Find the Metric Value by following the algorithm on the worksheet.
- (4.3) Answer the Evaluation Worksection - evaluate the products based on the data elements as they apply to the system.
- (4.4) When you have repeated this procedure for all the Metric Worksheets in the set, you are ready to use the Criteria Worksheets.

Step 5 - CRITERIA WORKSHEETS

- (5.1) Each numbered item in the Metric Summary Worksection represents an individual Metric Value.

- (5.2) Find the Form Code in the SOURCE box of the Criteria Worksheet.
- (5.3) Find the Metric Worksheet with the same Form Code and transfer its Metric Value into the box to the right of the item in the Criteria Worksheet.
- (5.4) Repeat this process for all items in the Metric Summary Worksection.
- (5.5) Find the Criteria Value by following the algorithm on the worksheet.
- (5.6) Answer the Evaluation Worksection - evaluate the products based on the Metrics as they apply to the system.

Step 6 - FACTOR WORKSHEETS

- (6.1) Each numbered item in the Criteria Summary Worksection represents an individual Criterion Value.
- (6.2) Find the Form Code in the SOURCE box of the Factor Worksheet.
- (6.3) Find the Criteria Worksheet with the same Form Code and transfer its Criteria Value into the box in the Score column in the Factor Worksheet.
- (6.4) Repeat this process for all items in the Criteria Summary Worksection.
- (6.5) Answer the Evaluation Worksection - evaluate the products based on the Criteria as they apply to the system.
- (6.6) Find the Factor Value by following the algorithm on the Worksheet.

STEPS FOR UPDATE APPLICATIONS

Step 1

Determine the update necessary. The Product Tables at the end of these instructions list the updates required and the activities and products associated with each update. Also review Section 2.3.2, "Update Information Requirements", in the General Instructions Handbook for further information if necessary.

Step 2

Obtain the required products. The Products Tables at the end of these Instructions list the products required for each update application.

Step 3

Reapply the Metric, Criteria, and Factor worksheets by following the procedure already outlined in "Steps for Completing Worksheets", of these Instructions. "How to Use Score Chart sets", explains the procedure for reporting the update scores.

HOW TO USE SCORE CHART SETS

When you apply worksheets to system/subsystem/module, you must apply some worksheets more than once in the Computer Program Life Cycle. Because of this, a Score Chart set is organized so that the groups of worksheet scores, acquired at the times a set of worksheets is applied, can be recorded separately: originals & updates.

The Score Chart set (at the end of each worksheet set) is composed of similar tree structure diagrams. Each Score Chart represents the complete hierarchy of scores to be acquired during any one application of worksheets sets in the Life Cycle.

When applying any worksheet, in order to record scores you must locate and use the Score Chart that corresponds to the current phase in the Life Cycle. In a Score Chart set, the first Score Chart (labeled FIRST MEASUREMENT) is designed to receive the scores from the first application of a worksheet set in the Life Cycle, and the following charts (i.e., labeled SECOND MEASUREMENT, etc.) are designed to receive the scores from the updates.

Each data element in the Metrics Worksheet has a unique number in the Data Element Dictionary, which is listed in the first column in the Score Chart. The next two columns of boxes in a Score Chart show a worksheet set's individual data element raw scores and its interpreted response (Yes/No, = 1 or 0, etc.). The last three box columns map out the Metric, Criteria and Factor worksheets of a set, each box representing the total score of a corresponding worksheet.

Once you have finished scoring a Worksheet set and located the corresponding Score Chart set, use the following procedure for filling out the Score Chart:

Step 1 - ANSWER OF DATA ELEMENT/DATA ELEMENT SCORE

For each data element in a Metric Worksheet:

- (1.1) Reference its number in the "Data Element Number" Column in the Score Chart.
- (1.2) Transfer the answers you gave to the questions in the Data Collection Worksection to the corresponding box under the column headed "Answer of Data Element"
- (1.3) Transfer the Scores of the data element from the Data Collection Worksection to its corresponding box under column labeled "Data Element Score".
- (1.4) Repeat this step for all data elements within this phase.

Step 2 - METRIC SCORE

Each box in this column represents the Score from the Metric Worksection of a Metric Worksheet. Transfer the Metric Value from each Metric Worksheet into the corresponding boxes in the Score Chart's Metric Score Column.

Step 3 - CRITERIA SCORE

Each box in this column represents the score from the Criteria Worksection of a Criteria Worksheet into the corresponding boxes of the Score Chart's Criteria Score Column.

Step 4 - FACTOR SCORE

Each box in this column represents the score from the Factor Worksection of a Quality Factor Worksheet. Transfer the Factor from the set's Factor Worksheet into corresponding boxes of the Score Chart's Factor Score Column.

These Score Chart sets will provide a historical base for repeated application of the metrics to a system at all levels. They are also a useful means of reporting your finds to the program manager in a condensed and compact form.

PRODUCTS	TRADE-OFF STUDY REPORTS	INITIAL OR AUTHENTICATED SYSTEM SPEC, SEGMENT SPEC	AUTHENTICATED DEVELOPMENT SPEC FOR CPCI	HIGHER LEVEL SPEC	DRAFT PRODUCT SPECS	PDR MINUTES AND ACTION ITEM RESPONSES
WORKSHEET SET TO BE APPLIED	REQUIREMENTS ANALYSIS WORKSHEETS				PRELIMINARY DESIGN WORKSHEETS	

ESD PRODUCTS FOR ANALYSIS PHASE

Apply the Requirement Analysis Worksheets as the following types of products become available. See note below.

- Product A.1 - Trade-off Study Reports
- Product A.2 - Initial or Authenticated System Specification & Segment Specification (if any)
- Product B.1 - Authenticated Development Specification for each CPCI
- Product B.2 - Possible higher-level specification, ICD and changes

Apply the Preliminary Design Worksheets as the following types of products become available. See note below.

- Product B.3 - Parts of draft Product Specifications containing design approaches for each CPCI
- Product C. - PDR minutes and action item responses

NOTE: If these products do not contain the information requested by the Data Element questions, other contractor-supplied information should be searched.

PRODUCTS	FUNCTIONAL FLOW CHARTS	DE- TAILED FLOW CHART	DATA FORMAT DESC.	ALGO- RITHM DESC.	PRELIMI- NARY PRODUCT DESC.	CDR MINUTES ACTION ITEM RESPON- SES	SYSTEM SEG- MENT TEST PLANS	PRELIM. CPCI TEST PRO- CEDURES
WORKSHEET SET TO BE APPLIED	DETAILED DESIGN WORKSHEETS						PRELIMINARY DESIGN WORKSHEETS, (UPDATE)	

ESD PRODUCTS FOR DESIGN PHASE

Apply the Detailed Design Worksheets as the following types of products become available. See note below.

- Product A.1: Functional flowcharts
- Product A.2: Detailed flowcharts
- Product A.3: Data format descriptions
- Product A.4: Descriptions of algorithms not previously prescribed
- Product B. : Preliminary Product Specifications, including the above
- Product D. : CDR minutes & action item responses

Apply the Preliminary Design Worksheets for Update as the following types of products become available. See note.

- Product C.1: System, Segment and CPCI Test Plans
- Product C.2: Preliminary CPCI Test Procedures

NOTE: If these products do not contain the information requested by the Data Element questions, other contractor-supplied information should be searched.

PRODUCTS	CODE	ALTERED PRODUCT SPECS
WORKSHEET SET TO BE APPLIED	IMPLEMENTATION WORKSHEETS	DETAILED DESIGN WORKSHEETS (UPDATE)

ESD PRODUCTS FOR CODING AND CHECKING PHASE

Apply the Implementation Worksheets as the code becomes available.

Apply the Detailed Design Worksheets for Update as the following types of products become available. See note below.

- Product C. - Altered Product Specifications, including compiler/assembly listings.

NOTE: If these products do not contain the information requested by the Data Element questions, other contractor-supplied information should be searched.

PRODUCTS	FINAL CPCI TEST PROCEDURES	SEGMENT & SYSTEM LEVEL TEST PROCEDURES	TEST REPORTS	CODING CHANGES	MODIFIED PRODUCT SPECS	HIGH LEVEL SPECS
WORKSHEET SET TO BE APPLIED	PRELIMINARY DESIGN WORKSHEETS			IMPLEMEN- TATION WORKSHEETS	DETAILED DESIGN WORKSHEETS (UPDATE)	

ESD PRODUCTS FOR TEST AND
INTEGRATION PHASE

Apply the Preliminary Design Worksheets for Update as the following types of products become available. See note below.

- A Product 1: Final CPCI Test Procedures
- Product 2: Segment (if any) and system-level Test Procedures

- B-D Product 1: Test Reports

Apply the Implementation Worksheets for Update as the following types of products become available. See note below.

- B-D Product 2: Computer Program Coding Changes

Apply the Detailed Design Worksheets for Update as the following types of products become available. See note.

- B-D Product 3: Modified Product Specification
- Product 4: Possible high-level specification, ICD and changes.

NOTE: If these products do not contain the information requested by the Data Element questions, other contractor-supplied information should be searched.

MODULAR IMPLEMENTATION MEASURE

Form Code: RuDDM.1

LIFE CYCLE PHASE:
DETAIL DESIGN

SOURCE(S):

- ☐ SYSTEM
☐ SUBSYSTEM
☐ MODULE

NAME: _____

I. DATA COLLECTION WORKSECTION:			SCORE
1.0 <u>Controlling Parameters</u> (87)			
1.1	Number of calling sequence parameters that are control variables.	☐	
1.2	Number of calling sequence parameters.	☐	
Score = <u>1.1</u> + <u>1.2</u>			☐
2.0 <u>Controlling Input</u> (88)			
2.1	Is input passed as calling sequence parameters?	☒ Y ☐ N	☐
Yes = 1, No = 0			
3.0 <u>Controlling Output</u> (89)			
3.1	Is output data passed back to calling module?	☒ Y ☐ N	☐
Yes = 1, No = 0			
4.0 <u>Controlling Return</u> (90)			
4.1	Is control returned to calling module?	☒ Y ☐ N	☐
Yes = 1, No = 0			

PREPARED BY: _____ APPROVED BY: _____
DATE: _____ DATE: _____

MODULAR IMPLEMENTATION MEASURE

Form Code: RuDDM.1

LIFE CYCLE PHASE:
DETAIL DESIGN

SOURCE(S):

- ☐ SYSTEM
☐ SUBSYSTEM
☐ MODULE

NAME: _____

I. DATA COLLECTION WORKSECTION (continued):

SCORE

5.0 Share Temporary Storage (91)

5.1 Is temporary storage independent of
other modules?

☐ Y ☐ N

Yes = 1, No = 0

☐

II. METRIC WORKSECTION:

Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the
reviewed products based on the data elements above?
(1-10) _____ (§ If you are unable to evaluate)

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

GENERALITY CHECKLIST

Form Code: RuDDM.2

LIFE CYCLE PHASE:
DETAIL DESIGN

SOURCE(S):

- ☐ SYSTEM
☐ SUBSYSTEM
☐ MODULE

NAME: _____

I. DATA COLLECTION WORKSECTION:

SCORE

1.0 Unmixed Processing and Input/Output (92)

1.1 Does the module not mix input, output, and processing functions in the same module?

☐ Y ☐ N

Yes = 1, No = 0

2.0 Machine Dependent Functions (93)

2.1 Number of machine dependent functions performed.

☐

Score = 1 + ☐ 2.1

3.0 Unlimited Data Volume (94)

3.1 Is processing data volume unlimited?

☐ Y ☐ N

Yes = 1, No = 0

4.0 Unlimited Data Value (95)

4.1 In the Design Phase, is processing data value unlimited?

☐ Y ☐ N

Yes = 1, No = 0

II. METRIC WORKSECTION:

Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the data elements above?
(1-10) _____ (§ If you are unable to evaluate)

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

MACHINE INDEPENDENCE MEASURE

Form Code: RuDDM.3

LIFE CYCLE PHASE:

DETAIL DESIGN

SOURCE(S):

☐ SYSTEM

NAME: _____

☐ SUBSYSTEM

☐ MODULE

I. DATA COLLECTION WORKSECTION:

SCORE

1.0 Programming Language Availability (97)

1.1 Is the programming language available in other machines?

☐ Y ☐ N

Yes = 1, No = 0

II. METRIC WORKSECTION:

Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the data elements above?
(1-10) _____ (§ If you are unable to evaluate)

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

SOFTWARE SYSTEM INDEPENDENCE MEASURE

Form Code: RuDDM.4

LIFE CYCLE PHASE:
DETAIL DESIGN

SOURCE(S):

- ☐ SYSTEM
☐ SUBSYSTEM
☐ MODULE

NAME: _____

I. DATA COLLECTION WORKSECTION:

SCORE

1.0 Dependence on Software System Utility Programs (85)

1.1 Number of references to system library routines, utilities, or other system provided facilities or functions.

1.2 Number of total lines of code.

$$\text{Score} = 1 - \left(\frac{1.1}{1.2} \right)$$

2.0 Standard Language Used (96)

2.1 Is a common standard subset of a programming language to be used?

 Y N

Yes = 1, No = 0

II. METRIC WORKSECTION:

$$\text{Metric Value} = \frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$$

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the data elements above?
(1-10) _____ (0 If you are unable to evaluate)

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

MODULARITY

Form Code: RuDDC.1

LIFE CYCLE PHASE:
DETAIL DESIGN

SOURCE(S):
RuDDM.1

- ☐ SYSTEM
☐ SUBSYSTEM
☐ MODULE

NAME: _____

I. METRIC SUMMARY WORKSECTION:

1. Modular Implementation Measure

SCORE

☐

II. CRITERIA WORKSECTION:

Criteria Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Metrics}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the metrics above?
(1-10) _____ (§ If you are unable to evaluate)

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

GENERALITY

Form Code: RuDDC.2

LIFE CYCLE PHASE:
DETAIL DESIGN

SOURCE(S):
RuDDM.2

- ☐ SYSTEM
☐ SUBSYSTEM
☐ MODULE

NAME: _____

I. METRIC SUMMARY WORKSECTION:

1. Generality Checklist

SCORE

☐

II. CRITERIA WORKSECTION:

Sum of Above
Scores
Criteria Value = $\frac{\text{No. of Metrics}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the
reviewed products based on the metrics above?
(1-10) _____ (Ø If you are unable to evaluate)

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

MACHINE INDEPENDENCE

Form Code: RuDDC.3

LIFE CYCLE PHASE:

DETAIL DESIGN

SOURCE(S):

RuDDM.3

☐

SYSTEM

NAME: _____

☐

SUBSYSTEM

☐

MODULE

I. METRIC SUMMARY WORKSECTION:

1. Machine Independence Measure

SCORE

☐

II. CRITERIA WORKSECTION:

Criteria Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Metrics}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the metrics above?
(1-10) _____ (§ If you are unable to evaluate)

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

SOFTWARE SYSTEM INDEPENDENCE

Form Code: RuDDC.4

LIFE CYCLE PHASE:

DETAIL DESIGN

SOURCE(S):

RuDDM.4

☐

SYSTEM

NAME: _____

☐

SUBSYSTEM

☐

MODULE

I. METRIC SUMMARY WORKSECTION:

1. Software System Independence Measure

SCORE

☐

II. CRITERIA WORKSECTION:

Criteria Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Metrics}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the metrics above?
(1-10) _____ (§ If you are unable to evaluate)

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

REUSABILITY

Form Code: RuDDF.1

LIFE CYCLE PHASE:
DETAIL DESIGN

SOURCE(S):

RuDDC.1

RuDDC.2

☐ SYSTEM

NAME: _____

☐ SUBSYSTEM

RuDDC.3

RuDDC.4

☐ MODULE

I. CRITERIA SUMMARY WORKSECTION:

1. Modularity
2. Generality
3. Machine Independence
4. Software System Independence

SCORE

☐
☐
☐
☐

II. FACTOR WORKSECTION:

Factor Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Criteria}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the criteria above?
(1-10) _____ (0 If you are unable to evaluate)

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

REUSABILITY

Complete this score chart if application of this set of worksheets is appropriate when products of A1, A2, A3, A4, B and D in Design Phase become available.

<u>Data Element Number</u>	<u>Answer of Data Element</u>	<u>Data Element Score</u>	<u>Metric Score</u>	<u>Criteria Score</u>	<u>Factor Score</u>
<u>87</u>					
<u>88</u>					
<u>89</u>					
<u>90</u>					
<u>91</u>					
<u>92</u>					
<u>93</u>					
<u>94</u>					
<u>95</u>					
<u>97</u>					
<u>85</u>					
<u>96</u>					

FIRST MEASUREMENT

Date _____

REUSABILITY

Complete this score chart if application of this set of worksheets is appropriate when product of C in Coding and Checkout Phase is available.

<u>Data Element Number</u>	<u>Answer of Data Element</u>	<u>Data Element Score</u>	<u>Metric Score</u>	<u>Criteria Score</u>	<u>Factor Score</u>
<u>87</u>					
<u>88</u>					
<u>89</u>					
<u>90</u>					
<u>91</u>					
<u>92</u>					
<u>93</u>					
<u>94</u>					
<u>95</u>					
<u>97</u>					
<u>85</u>					
<u>96</u>					

SECOND MEASUREMENT

Date _____

REUSABILITY

Complete this score chart if a third application of this set of worksheets is appropriate for update when products of B-D3, B-D4 in Test and Integration phase become available.

<u>Data Element Number</u>	<u>Answer of Data Element</u>	<u>Data Element Score</u>	<u>Metric Score</u>	<u>Criteria Score</u>	<u>Factor Score</u>
<u>87</u>					
<u>88</u>					
<u>89</u>					
<u>90</u>					
<u>91</u>					
<u>92</u>					
<u>93</u>					
<u>94</u>					
<u>95</u>					
<u>97</u>					
<u>85</u>					
<u>96</u>					

THIRD MEASUREMENT

Date _____

MODULAR IMPLEMENTATION MEASURE

Form Code: RuIMM.1

LIFE CYCLE PHASE:

IMPLEMENTATION

SOURCE(S):

- ☐ SYSTEM
☐ SUBSYSTEM
☐ MODULE

NAME: _____

I. DATA COLLECTION WORKSECTION:

SCORE

1.0 Controlling Parameters (87)

1.1 Number of calling sequence parameters
 that are control variables. ☐

1.2 Number of calling sequence parameters ☐

Score = ÷

2.0 Controlling Input (88)

2.1 Is input passed as calling sequence
 parameters?

If Yes = 1, No = 0

3.0 Controlling Output (89)

3.1 Is output data passed back to
 calling module?

If Yes = 1, No = 0

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

MODULAR IMPLEMENTATION MEASURE

Form Code: RuIMM.1

LIFE CYCLE PHASE:
IMPLEMENTATION

SOURCE(S):

- ☐ SYSTEM
☐ SUBSYSTEM
☐ MODULE

NAME: _____

I. DATA COLLECTION WORKSECTION (continued):

SCORE

4.0 Controlling Return (90)

4.1 Is control returned to calling module?

☐ Y ☐ N

If Yes = 1, No = 0

☐

II. METRIC WORKSECTION:

Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the data elements above?
(1-10) _____ (# If you are unable to evaluate)

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

GENERALITY CHECKLIST

Form Code: RuIMM.2

LIFE CYCLE PHASE:

SOURCE(S):

IMPLEMENTATION

- ☐ SYSTEM
☐ SUBSYSTEM
☐ MODULE

NAME: _____

I. DATA COLLECTION WORKSECTION:

SCORE

1.0 Unmixed Processing and Input/Output (92)

1.1 Does the module not mix input, output, and processing functions in the same module?

Y N

Yes = 1, No = 0

☐

2.0 Machine Dependent Functions (93)

2.1 Number of machine dependent functions performed.

☐

Score = 1 + 2.1

☐

3.0 Unlimited Data Volume (94)

3.1 Can the amounts of data that can be processed be unlimited?

Y N

Yes = 1, No = 0

☐

4.0 Unlimited Data Value (95)

4.1 In the Implementation Phase, is the value of data that can be processed unlimited?

Y N

Yes = 1, No = 0

☐

II. METRIC WORKSECTION:

Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the data elements above?
 (1-10) _____ (Ø If you are unable to evaluate)

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

QUANTITY OF COMMENTS MEASURE

Form Code: RUJMM.3

LIFE CYCLE PHASE:
IMPLEMENTATION

SOURCE(S):

- ☐ SYSTEM
☐ SUBSYSTEM
☐ MODULE

NAME: _____

I. DATA COLLECTION WORKSECTION:

SCORE

1.0 Quantity of Comments (117)

1.1 Number of non-blank lines of comments. ☐

1.2 Number of non-blank lines. ☐

score = +

II. METRIC WORKSECTION:

Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the data elements above? (1-10) _____ (§ If you are unable to evaluate)

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

EFFECTIVENESS OF COMMENTS MEASURE

Form Code: RuIMM.4

LIFE CYCLE PHASE:
IMPLEMENTATIONSOURCE(S):

- ☐ SYSTEM
☐ SUBSYSTEM
☐ MODULE

NAME: _____

_____I. DATA COLLECTION WORKSECTION:

SCORE

1.0 Prologue Comments (118)1.1 Are there prologue comments containing
information about the function, author,
version number, date inputs, outputs,
assumptions and limitations?

Y N

Yes = 1, No = 0

2.0 Control and Destinations Comment (119)2.1 How many decision points and transfers
of control are not commented?

2.2 Total number of decision points.

Score = $1 - ([2.1] \div [2.2])$ 3.0 Machine Dependent Code Comment (120)3.1 Is all machine language code
commented?

Y N

Yes = 1, No = 0

4.0 Non-standard HOL Statements Comment (121)4.1 Are non-standard HOL statements
commented?

Y N

Yes = 1, No = 0

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

EFFECTIVENESS OF COMMENTS MEASURE

Form Code: RuIMM.4

LIFE CYCLE PHASE:
IMPLEMENTATION

SOURCE(S):

- ☐ SYSTEM
☐ SUBSYSTEM
☐ MODULE

NAME: _____

I. DATA COLLECTION WORKSECTION (continued):

SCORE

5.0 Declared Variables Commented (122)

5.1 How many declared variables are not described by comments? ☐

5.2 Number of variables. ☐

$$\text{Score} = 1 - ([5.1] \div [5.2])$$

6.0 Comments Which Do Not Only Repeat the Operation (124)

6.1 Do the comments do more than repeat the operation? ☐ Y ☐ N

Yes = 1, No = 0

7.0 Identification of Comments (137)

7.1 Are comments set off from the code in a uniform manner? ☐ Y ☐ N

Yes = 1, No = 0

II. METRIC WORKSECTION:

$$\text{Metric Value} = \frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$$

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the data elements above?
(1-10) _____ (# If you are unable to evaluate)

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

DESCRIPTIVENESS OF IMPLEMENTATION LANGUAGE MEASURE

Form Code: RuIMM.5

LIFE CYCLE PHASE:
IMPLEMENTATION

SOURCE(S):

- ☐ SYSTEM
☐ SUBSYSTEM
☐ MODULE

NAME: _____

I. DATA COLLECTION WORKSECTION:

SCORE

1.0 High Order Language (107)

1.1 Is high order language used?

☐ Y ☐ N

Yes = 1, No = 0

☐

2.0 Variables Names (123)

2.1 Are variable name (mnemonics)
descriptive of the physical or
functional property they represent?

☐ Y ☐ N

Yes = 1, No = 0

☐

3.0 Blocked and Indented Source Code (125)

3.1 Is the code logically blocked and
indented?

☐ Y ☐ N

Yes = 1, No = 0

☐

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

DESCRIPTIVENESS OF IMPLEMENTATION LANGUAGE MEASURE

Form Code: RuIMM.5

LIFE CYCLE PHASE: IMPLEMENTATION		SOURCE(S): _____ _____
☐ SYSTEM	NAME: _____	
☐ SUBSYSTEM	_____	
☐ MODULE	_____	

I. <u>DATA COLLECTION WORKSECTION (continued):</u>	SCORE
4.0 <u>One Statement Per Line (126)</u> 4.1 Number of lines with more than one statement. ☐ 4.2 Number of continuous lines. ☐ 4.3 The total number of lines in a module. ☐ Score = 1 - $\frac{4.1 + 4.2}{4.3}$	☐
II. <u>METRIC WORKSECTION:</u> Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$	☐
III. <u>EVALUATION WORKSECTION:</u> What is your evaluation of the reviewed products based on the data elements above? (1-10) _____ (Ø If you are unable to evaluate)	
IV. <u>INSPECTOR'S COMMENTS:</u>	

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

SOFTWARE SYSTEM INDEPENDENCE MEASURE

Form Code: RuIMM.6

LIFE CYCLE PHASE:
IMPLEMENTATION

SOURCE(S):

- ☐ SYSTEM
☐ SUBSYSTEM
☐ MODULE

NAME: _____

I. DATA COLLECTION WORKSECTION:

SCORE

1.0 Dependence on Software System Utility Programs (85)

1.1 Number of references to system library routines, utilities, or other system provided facilities or functions.

1.2 Number of total lines of code.

$$\text{Score} = 1 - \left(\frac{1.1}{1.2} \right)$$

II. METRIC WORKSECTION:

$$\text{Metric Value} = \frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$$

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the data elements above?
(1-10) _____ (# If you are unable to evaluate)

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

MODULARITY

Form Code: RuIMC.1

LIFE CYCLE PHASE:
IMPLEMENTATION

SOURCE(S):
RuIMM.1

- ☐ SYSTEM
☐ SUBSYSTEM
☐ MODULE

NAME: _____

I. METRIC SUMMARY WORKSECTION:

SCORE

1. Modular Implementation Measure

☐

II. CRITERIA WORKSECTION:

Sum of Above
Scores
Criteria Value = $\frac{\text{No. of Metrics}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the
reviewed products based on the metrics above?
(1-10) _____ (§ If you are unable to evaluate)

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

SELF-DESCRIPTIVENESS

Form Code: RuIMC.2

LIFE CYCLE PHASE:
IMPLEMENTATION

SOURCE(S):

RuIMM.3

RuIMM.4

☐ SYSTEM

NAME: _____

☐ SUBSYSTEM

☐ MODULE

RuIMM.5

I. METRIC SUMMARY WORKSECTION:

1. Quantity of Comments Measure
2. Effectiveness of Comments Measure
3. Descriptiveness of Implementation Language Measure

SCORE

☐☐☐

II. CRITERIA WORKSECTION:

Sum of Above
Scores
Criteria Value = $\frac{\text{No. of Metrics}}{\text{No. of Metrics}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the metrics above?
(1-10) _____ (§ If you are unable to evaluate)

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

<u>GENERALITY</u>		Form Code: <u>RuIMC.2</u>
LIFE CYCLE PHASE: IMPLEMENTATION		SOURCE(S): <u>RuIMM.2</u>
☐ SYSTEM ☐ SUBSYSTEM ☐ MODULE	NAME: _____ _____ _____	
I. <u>METRIC SUMMARY WORKSECTION:</u> 1. Generality Checklist		SCORE ☐
II. <u>CRITERIA WORKSECTION:</u> Sum of Above Scores Criteria Value = $\frac{\text{No. of Metrics}}{\text{No. of Metrics}}$		☐
III. <u>EVALUATION WORKSECTION:</u> What is your evaluation of the reviewed products based on the metrics above? (1-3) _____ (0 If you are unable to evaluate)		

PREPARED BY: _____ APPROVED BY: _____
 DATE: _____ DATE: _____

SOFTWARE SYSTEM INDEPENDENCE

Form Code: RuIMC.4

LIFE CYCLE PHASE:
IMPLEMENTATION

SOURCE(S):
RuIMM.6

- ☐ SYSTEM
☐ SUBSYSTEM
☐ MODULE

NAME: _____

I. METRIC SUMMARY WORKSECTION:

SCORE

1. Software System Independence Measure

☐

II. CRITERIA WORKSECTION:

Sum of Above
Scores
Criteria Value = $\frac{\text{No. of Metrics}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the metrics above?
(1-10) _____ (Ø If you are unable to evaluate)

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

REUSABILITY

Form Code: RuIMF.1

LIFE CYCLE PHASE:

IMPLEMENTATION

- ☐ SYSTEM
☐ SUBSYSTEM
☐ MODULE

NAME: _____

SOURCE(S):

RuIMC.1

RuIMC.2

RuIMC.3

RuIMC.4

I. CRITERIA SUMMARY WORKSECTION:

1. Modularity
2. Generality
3. Self-Descriptiveness
4. Software System Independence

SCORE

☐
☐
☐
☐

II. FACTOR WORKSECTION:

Factor Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Criteria}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the criteria above?
(1-10) _____ (Ø If you are unable to evaluate)

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

REUSABILITY

Complete this score chart if application of this set of worksheets is appropriate for update when products of A and B in Coding and Checkout Phase are available.

<u>Data Element Number</u>	<u>Answer of Data Element</u>	<u>Data Element Score</u>	<u>Metric Score</u>	<u>Criteria Score</u>	<u>Factor Score</u>
<u>87</u>					
<u>88</u>					
<u>89</u>					
<u>90</u>					
<u>92</u>					
<u>93</u>					
<u>94</u>					
<u>95</u>					
<u>117</u>					
<u>118</u>					
<u>119</u>					
<u>120</u>					
<u>121</u>					
<u>122</u>					
<u>124</u>					
<u>137</u>					
<u>107</u>					
<u>123</u>					
<u>125</u>					
<u>126</u>					
<u>85</u>					

FIRST MEASUREMENT

Date

REUSABILITY

Complete this score chart if application of this set of worksheets is appropriate when products of B-D2 in Test and Integration Phase is available.

<u>Data Element Number</u>	<u>Answer of Data Element</u>	<u>Data Element Score</u>	<u>Metric Score</u>	<u>Criteria Score</u>	<u>Factor Score</u>
<u>87</u>					
<u>88</u>					
<u>89</u>					
<u>90</u>					
<u>92</u>					
<u>93</u>					
<u>94</u>					
<u>95</u>					
<u>117</u>					
<u>118</u>					
<u>119</u>					
<u>120</u>					
<u>121</u>					
<u>122</u>					
<u>124</u>					
<u>137</u>					
<u>107</u>					
<u>123</u>					
<u>125</u>					
<u>126</u>					
<u>85</u>					

Date

SECOND MEASUREMENT

REUSABILITY

Complete this score chart if application of this set of worksheets is appropriate when products of B-D2 in Test and Integration Phase is available.

<u>Data Element Number</u>	<u>Answer of Data Element</u>	<u>Data Element Score</u>	<u>Metric Score</u>	<u>Criteria Score</u>	<u>Factor Score</u>
<u>87</u>					
<u>88</u>					
<u>89</u>					
<u>90</u>					
<u>92</u>					
<u>93</u>					
<u>94</u>					
<u>95</u>					
<u>117</u>					
<u>118</u>					
<u>119</u>					
<u>120</u>					
<u>121</u>					
<u>122</u>					
<u>124</u>					
<u>137</u>					
<u>107</u>					
<u>123</u>					
<u>125</u>					
<u>126</u>					
<u>85</u>					

THIRD MEASUREMENT

Date

QUALITY FACTOR

MODULE NO. 11

INTEROPERABILITY

TABLE OF CONTENTS

<u>TITLE</u>	<u>PAGE</u>
<u>INTRODUCTION AND INSTRUCTIONS FOR INTEROPERABILITY MODULE</u>	
INTRODUCTION TO INTEROPERABILITY	Ip-1
STEPS FOR COMPLETING WORKSHEETS	Ip-5
STEPS FOR UPDATE APPLICATIONS	Ip-8
HOW TO USE SCORE CHART SETS	Ip-9
ESD PRODUCTS FOR ANALYSIS PHASE	Ip-12
ESD PRODUCTS FOR DESIGN PHASE	Ip-13
ESD PRODUCTS FOR CODING AND CHECKING PHASE. .	Ip-14
ESD PRODUCTS FOR TEST AND INTEGRATION PHASE .	Ip-15
 <u>QUALITY FACTOR NO. 11 INTEROPERABILITY WORKSHEETS</u>	
WORKSHEETS FOR REQUIREMENTS ANALYSIS PHASE. .	Ip-16
WORKSHEETS FOR PRELIMINARY DESIGN PHASE . . .	Ip-22
WORKSHEETS FOR DETAIL DESIGN PHASE.	Ip-29
WORKSHEETS FOR IMPLEMENTATION PHASE	Ip-35

This QUALITY FACTOR MODULE is one of a set of eleven modules that are components of the "COMPUTER SYSTEMS ACQUISITION METRICS HANDBOOK".

INTRODUCTION AND INSTRUCTIONS
FOR
INTEROPERABILITY MODULE

INTRODUCTION TO INTEROPERABILITY

The Quality Factor Interoperability represents a measure of the effort required to couple one system with another. FIGURES Ip - 1 through Ip - 4 represent the hierarchy of Metric, Criteria and Quality Factor worksheets associated with Interoperability in Requirements Analysis, Preliminary Design, Detailed Design and Implementation phases of the Software Development Life Cycle.

The worksheets in this module are grouped into four separate sets, one set for each Life Cycle phase. Each set consists of Metric worksheets, Criteria worksheets, a Factor worksheet and score charts.

METRIC WORKSHEETS

One or more DATA COLLECTION WORKSECTIONS which contain the data element scores for each Metric, and each Metric's Final Score.

CRITERIA WORKSHEETS

One or more METRIC SUMMARY WORKSECTIONS which contain the Metrics scores for each Criteria, and each Criteria's Final Score.

FACTOR WORKSHEETS

One CRITERIA SUMMARY WORKSECTION which contains each Criteria's score, and the Final Score for the Factor for that phase.

SCORE CHARTS:

One or more charts that record worksheet values throughout the Life Cycle.

However, the sequence in which the worksheet sets are applied is dependent on the availability of ESD Computer Program Life Cycle products. Usually the worksheets will be applied sequentially, except for updates.

These instructions show when the Interoperability worksheet sets and Score Charts are applied during the Computer Program Life Cycle. The Product Code referred to on the Score Charts is the code defined in the ESD Guidebook Series, Software Acquisition Management Guidebook, Life Cycle Events and reillustrated in the General Instructions. The Product Tables map the ESD Computer Program Life Cycle Products to the Metric Worksheets. The balance of these instructions are step-by-step procedures for completing the worksheets and score chart summaries.

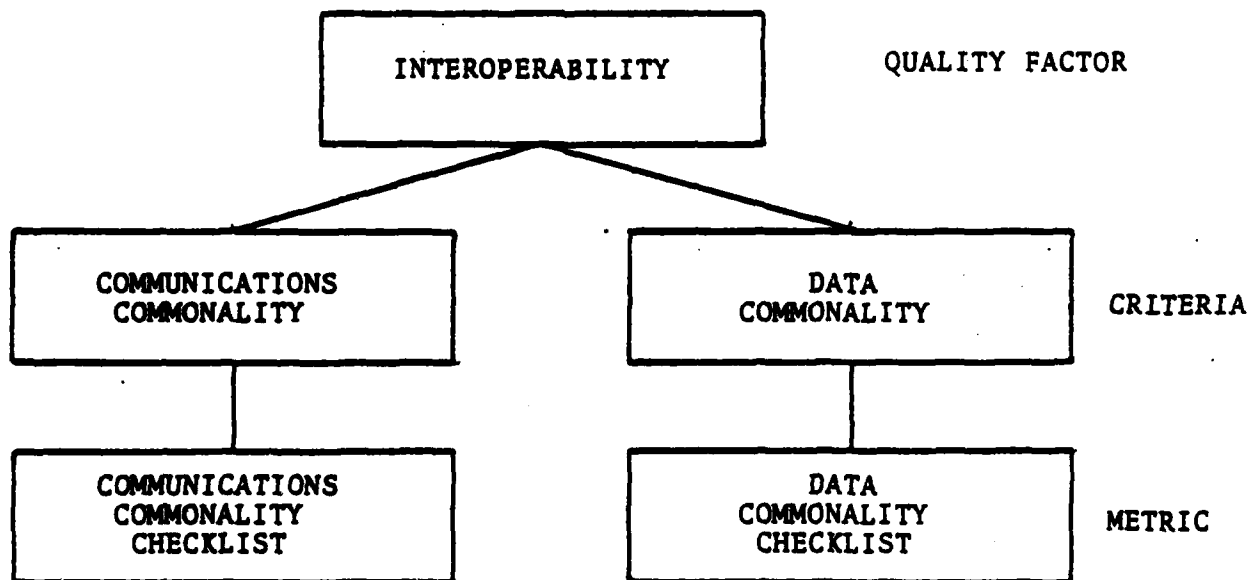


FIGURE Ip-1
REQUIREMENTS ANALYSIS WORKSHEET HIERARCHY

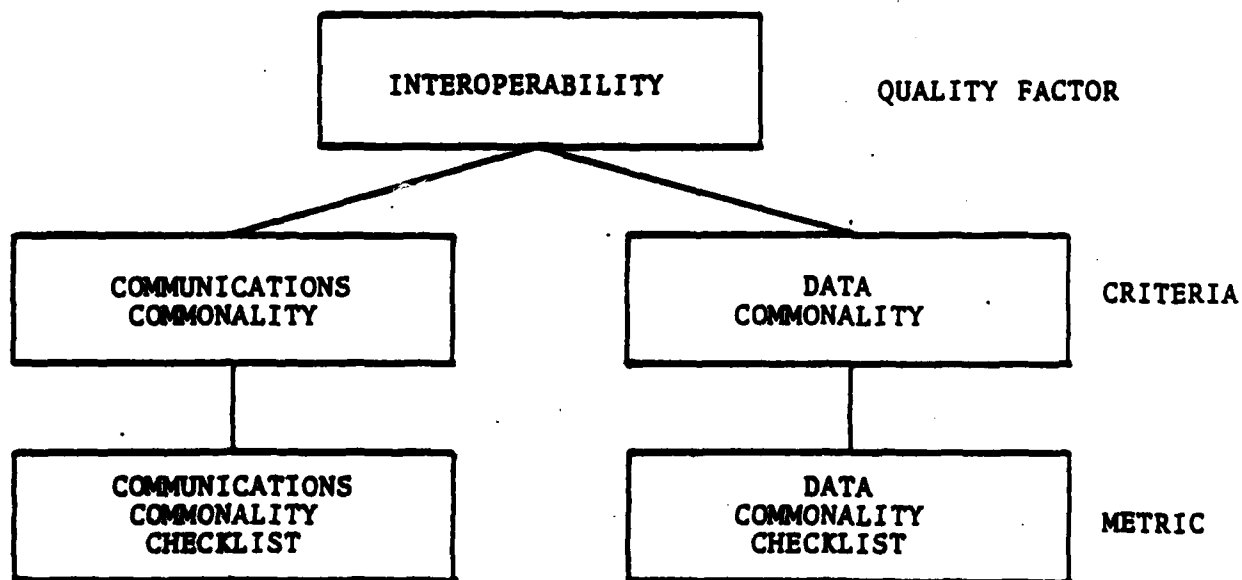


FIGURE Ip-2
PRELIMINARY DESIGN WORKSHEET HIERARCHY

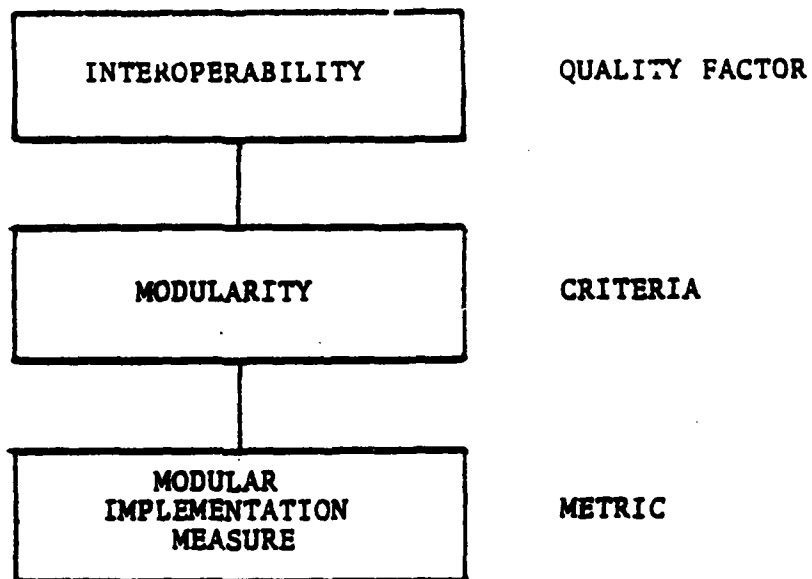


FIGURE Ip-3
DETAILED DESIGN WORKSHEET HIERARCHY

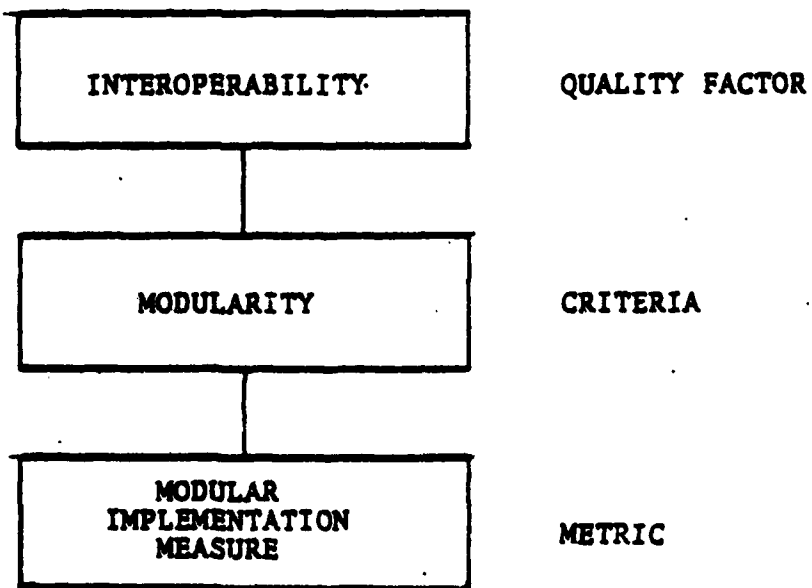


FIGURE Ip-4
IMPLEMENTATION WORKSHEET HIERARCHY

STEPS FOR COMPLETING WORKSHEETS

Step 1

Enter the appropriate information in the following blocks:

- (1.1) SYSTEM/SUBSYSTEM/MODULE block-Indicate the level of application.
- (1.2) NAME block-List the name of the system being measured.
- (1.3) SOURCE block-On Metric Worksheets, list the source document.
- (1.4) The PREPARED BY and DATE blocks should contain the name of the person performing the software metrics, and the current date.

Step 2

Determine the current Computer Program Life Cycle Phase. This module is concerned with four phases of the Computer Program Life Cycle:

- (2.1) Requirements Analysis
- (2.2) Preliminary Design
- (2.3) Detail Design
- (2.4) Implementation

Step 3

Determine the available products from the phase and which data worksheet set to apply. Each Life Cycle phase has at least three different activities associated with it. The result of the completion of an activity is one or more documents called products.

Before a worksheet set can be applied, specific products associated with it must be obtained. The Product Tables, at the end of the instructions, detail the products required for each worksheet set.

Step 4 - METRIC WORKSHEETS

- (4.1) Answer each question in the Data Collection Worksection as it applies to the system/subsystem/module you are measuring and transfer its scored value to its corresponding SCORE block.

If the question calls for a YES/NO type response, a YES answer is scored at a 1.
a NO answer is scored as a 0.

The questions that call for a numeric quantity type response have specific instructions on how to score the response. Follow the instructions under each data element.

- (4.2) Find the Metric Value by following the algorithm on the worksheet.
- (4.3) Answer the Evaluation Worksection - evaluate the products based on the data elements as they apply to the system.
- (4.4) When you have repeated this procedure for all the Metric Worksheets in the set, you are ready to use the Criteria Worksheets.

Step 5 - CRITERIA WORKSHEETS

- (5.1) Each numbered item in the Metric Summary Worksection represents an individual Metric Value.

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ESD-TR-82-143(2)

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6 - 6

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END

DATE

FILED

11-7

- (5.2) Find the Form Code in the SOURCE box of the Criteria Worksheet.
- (5.3) Find the Metric Worksheet with the same Form Code and transfer its Metric Value into the box to the right of the item in the Criteria Worksheet.
- (5.4) Repeat this process for all items in the Metric Summary Worksection.
- (5.5) Find the Criteria Value by following the algorithm on the worksheet.
- (5.6) Answer the Evaluation Worksection - evaluate the products based on the Metrics as they apply to the system.

Step 6 - FACTOR WORKSHEETS

- (6.1) Each numbered item in the Criteria Summary Worksection represents an individual Criterion Value.
- (6.2) Find the Form Code in the SOURCE box of the Factor Worksheet.
- (6.3) Find the Criteria Worksheet with the same Form Code and transfer its Criteria Value into the box in the Score column in the Factor Worksheet.
- (6.4) Repeat this process for all items in the Criteria Summary Worksection.
- (6.5) Answer the Evaluation Worksection - evaluate the products based on the Criteria as they apply to the system.
- (6.6) Find the Factor Value by following the algorithm on the Worksheet.

STEPS FOR UPDATE APPLICATIONS

Step 1

Determine the update necessary. The Product Tables at the end of these instructions list the updates required and the activities and products associated with each update. Also review Section 2.3.2, "Update Information Requirements", in the General Instructions Handbook for further information if necessary.

Step 2

Obtain the required products. The Products Tables at the end of these Instructions list the products required for each update application.

Step 3

Reapply the Metric, Criteria, and Factor worksheets by following the procedure already outlined in "Steps for Completing Worksheets", of these Instructions. "How to Use Score Chart sets", explains the procedure for reporting the update scores.

HOW TO USE SCORE CHART SETS

When you apply worksheets to system/subsystem/module, you must apply some worksheets more than once in the Computer Program Life Cycle. Because of this, a Score Chart set is organized so that the groups of worksheet scores, acquired at the times a set of worksheets is applied, can be recorded separately: originals & updates.

The Score Chart set (at the end of each worksheet set) is composed of similar tree structure diagrams. Each Score Chart represents the complete hierarchy of scores to be acquired during any one application of worksheets sets in the Life Cycle.

When applying any worksheet, in order to record scores you must locate and use the Score Chart that corresponds to the current phase in the Life Cycle. In a Score Chart set, the first Score Chart (labeled FIRST MEASUREMENT) is designed to receive the scores from the first application of a worksheet set in the Life Cycle, and the following charts (i.e., labeled SECOND MEASUREMENT, etc.) are designed to receive the scores from the updates.

Each data element in the Metrics Worksheet has a unique number in the Data Element Dictionary, which is listed in the first column in the Score Chart. The next two columns of boxes in a Score Chart show a worksheet set's individual data element raw scores and its interpreted response (Yes/No, = 1 or 0, etc.). The last three box columns map out the Metric, Criteria and Factor worksheets of a set, each box representing the total score of a corresponding worksheet.

Once you have finished scoring a Worksheet set and located the corresponding Score Chart set, use the following procedure for filling out the Score Chart:

Step 1 - ANSWER OF DATA ELEMENT/DATA ELEMENT SCORE

For each data element in a Metric Worksheet:

- (1.1) Reference its number in the "Data Element Number" Column in the Score Chart.
- (1.2) Transfer the answers you gave to the questions in the Data Collection Worksection to the corresponding box under the column headed "Answer of Data Element"
- (1.3) Transfer the Scores of the data element from the Data Collection Worksection to its corresponding box under column labeled "Data Element Score".
- (1.4) Repeat this step for all data elements within this phase.

Step 2 - METRIC SCORE

Each box in this column represents the Score from the Metric Worksection of a Metric Worksheet. Transfer the Metric Value from each Metric Worksheet into the corresponding boxes in the Score Chart's Metric Score Column.

Step 3 - CRITERIA SCORE

Each box in this column represents the score from the Criteria Worksection of a Criteria Worksheet into the corresponding boxes of the Score Chart's Criteria Score Column.

Step 4 - FACTOR SCORE

Each box in this column represents the score from the Factor Worksection of a Quality Factor Worksheet. Transfer the Factor from the set's Factor Worksheet into corresponding boxes of the Score Chart's Factor Score Column.

These Score Chart sets will provide a historical base for repeated application of the metrics to a system at all levels. They are also a useful means of reporting your finds to the program manager in a condensed and compact form.

PRODUCTS	TRADE-OFF STUDY REPORTS	INITIAL OR AUTHENTICATED SYSTEM SPEC, SEGMENT SPEC	AUTHENTICATED DEVELOPMENT SPEC FOR CPCI	HIGHER LEVEL SPEC	DRAFT PRODUCT SPECS	PDR MINUTES AND ACTION ITEM RESPONSES
WORKSHEET SET TO BE APPLIED	REQUIREMENTS ANALYSIS WORKSHEETS				PRELIMINARY DESIGN WORKSHEETS	

ESD PRODUCTS FOR ANALYSIS PHASE

Apply the Requirement Analysis Worksheets as the following types of products become available. See note below.

- Product A.1 - Trade-off Study Reports
- Product A.2 - Initial or Authenticated System Specification & Segment Specification (if any)
- Product B.1 - Authenticated Development Specification for each CPCI
- Product B.2 - Possible higher-level specification, ICD and changes

Apply the Preliminary Design Worksheets as the following types of products become available. See note below.

- Product B.3 - Parts of draft Product Specifications containing design approaches for each CPCI
- Product C. - PDR minutes and action item responses

NOTE: If these products do not contain the information requested by the Data Element questions, other contractor-supplied information should be searched.

PRODUCTS	FUNCTIONAL FLOW CHARTS	DE- TAILED FLOW CHART	DATA FORMAT DESC.	ALGO- RITHM DESC.	PRELIMI- NARY PRODUCT DESC.	CDR MINUTES ACTION ITEM RESPON- SES	SYSTEM SEG- MENT TEST PLANS	PRELIM. CPCI TEST PRO- CEDURES
WORKSHEET SET TO BE APPLIED	DETAILED DESIGN WORKSHEETS						PRELIMINARY DESIGN WORKSHEETS, (UPDATE)	

ESD PRODUCTS FOR DESIGN PHASE

Apply the Detailed Design Worksheets as the following types of products become available. See note below.

- Product A.1: Functional flowcharts
- Product A.2: Detailed flowcharts
- Product A.3: Data format descriptions
- Product A.4: Descriptions of algorithms not previously prescribed
- Product B. : Preliminary Product Specifications, including the above
- Product D. : CDR minutes & action item responses

Apply the Preliminary Design Worksheets for Update as the following types of products become available. See note.

- Product C.1: System, Segment and CPCI Test Plans
- Product C.2: Preliminary CPCI Test Procedures

NOTE: If these products do not contain the information requested by the Data Element questions, other contractor-supplied information should be searched.

PRODUCTS	CODE	ALTERED PRODUCT SPECS
WORKSHEET SET TO BE APPLIED	IMPLEMENTATION WORKSHEETS	DETAILED DESIGN WORKSHEETS (UPDATE)

ESD PRODUCTS FOR CODING AND CHECKING PHASE

Apply the Implementation Worksheets as the code becomes available.

Apply the Detailed Design Worksheets for Update as the following types of products become available. See note below.

- Product C. - Altered Product Specifications, including compiler/assembly listings.

NOTE: If these products do not contain the information requested by the Data Element questions, other contractor-supplied information should be searched.

PRODUCTS	FINAL CPCI TEST PROCEDURES	SEGMENT & SYSTEM LEVEL TEST PROCEDURES	TEST REPORTS	CODING CHANGES	MODIFIED PRODUCT SPECS	HIGH LEVEL SPECS
WORKSHEET SET TO BE APPLIED	PRELIMINARY DESIGN WORKSHEETS			IMPLEMEN- TATION WORKSHEETS	DETAILED DESIGN WORKSHEETS (UPDATE)	

ESD PRODUCTS FOR TEST AND
INTEGRATION PHASE

Apply the Preliminary Design Worksheets for Update as the following types of products become available. See note below.

- A Product 1: Final CPCI Test Procedures
- Product 2: Segment (if any) and system-level Test Procedures

- B-D Product 1: Test Reports

Apply the Implementation Worksheets for Update as the following types of products become available. See note below.

- B-D Product 2: Computer Program Coding Changes

Apply the Detailed Design Worksheets for Update as the following types of products become available. See note.

- B-D Product 3: Modified Product Specification
- Product 4: Possible high-level specification, ICD and changes.

NOTE: If these products do not contain the information requested by the Data Element questions, other contractor-supplied information should be searched.

COMMUNICATION COMMONALITY CHECKLIST

Form Code: IpRAM.1

LIFE CYCLE PHASE:
REQUIREMENTS ANALYSIS

SOURCE(S):

- ☐ SYSTEM
☐ SUBSYSTEM
☐ MODULE

NAME: _____

I. DATA COLLECTION WORKSECTION:

SCORE

1.0 Communication with Other Systems (27)

**1.1 Is there a definitive statement of
the requirement for communication
with other systems?**

Y N

Yes = 1, No = 0

☐

II. METRIC WORKSECTION:

Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$

☐

**III. EVALUATION WORKSECTION: What is your evaluation of the
reviewed products based on the data elements above?
(1-10) _____ (0 If you are unable to evaluate)**

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

DATA COMMONALITY CHECKLIST

Form Code: IpRAM.2

LIFE CYCLE PHASE:

REQUIREMENT ANALYSIS

SOURCE(S):

- ☐ SYSTEM
☐ SUBSYSTEM
☐ MODULE

NAME: _____

I. DATA COLLECTION WORKSECTION:

SCORE

1.0 Standard Data Representation for Communication (28)

- 1.1 Is there a definitive statement of the requirement for standard data representation for communication with other systems?

☐ Y ☐ N

Yes = 1, No = 0

☐

II. METRIC WORKSECTION:

Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the data elements above?
(1-10) _____ (§ If you are unable to evaluate)

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

COMMUNICATION COMMONALITY

Form Code: IpRAC.1

LIFE CYCLE PHASE:

REQUIREMENTS ANALYSIS

SOURCE(S):

IpRAM.1

☐ SYSTEM

NAME: _____

☐ SUBSYSTEM

☐ MODULE

I. METRIC SUMMARY WORKSECTION:

1. Communication Commonality Checklist

SCORE

☐

II. CRITERIA WORKSECTION:

Criteria Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Metrics}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the metrics above?
(1-10) _____ (Ø If you are unable to evaluate)

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

DATA COMMONALITY

Form Code: IpRAC.2

LIFE CYCLE PHASE:

REQUIREMENTS ANALYSIS

SOURCE(S):

IpRAM.2

☐ SYSTEM

NAME: _____

☐ SUBSYSTEM

☐ MODULE

I. METRIC SUMMARY WORKSECTION:

1. Data Commonality Checklist

SCORE

☐

II. CRITERIA WORKSECTION:

Criteria Value $\frac{\text{Sum of Above Scores}}{\text{No. of Metrics}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the metrics above?
(1-10) _____ (§ If you are unable to evaluate)

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

INTEROPERABILITY

Form Code: IpRAF.1

LIFE CYCLE PHASE:

REQUIREMENTS ANALYSIS

SOURCE(S):

IpRAC.1

IpRAC.2

☐

SYSTEM

NAME: _____

☐

SUBSYSTEM

☐

MODULE

I. CRITERIA SUMMARY WORKSECTION:

1. Communication Commonality

2. Data Commonality

SCORE

☐☐

II. FACTOR WORKSECTION:

Factor Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Criteria}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the criteria above?
(1-10) _____ (If you are unable to evaluate)

PREPARED BY: _____ **APPROVED BY:** _____

DATE: _____ **DATE:** _____

INTEROPERABILITY

Complete this score chart if an application of this set of worksheets is appropriate when products of A1, A2, B1 and B2 in Analysis Phase become available.

<u>Data Element Number</u>	<u>Answer of Data Element</u>	<u>Data Element Score</u>	<u>Metric Score</u>	<u>Criteria Score</u>	<u>Factor Score</u>
<u>27</u>					
<u>28</u>					

FIRST MEASUREMENT

Date _____

Complete this score chart if a second application of this set of worksheets is appropriate for update.

<u>Data Element Number</u>	<u>Answer of Data Element</u>	<u>Data Element Score</u>	<u>Metric Score</u>	<u>Criteria Score</u>	<u>Factor Score</u>
<u>27</u>					
<u>28</u>					

SECOND MEASUREMENT

Date _____

COMMUNICATION COMMONALITY CHECKLIST

Form Code: IpPDM.1

LIFE CYCLE PHASE:

PRELIMINARY DESIGN

SOURCE(S):

☐ SYSTEM

NAME: _____

☐ SUBSYSTEM

☐ MODULE

I. DATA COLLECTION WORKSECTION:

SCORE

1.0 Communication Protocol Standards (46)

1.1 Have protocol standards been established, and are they followed?

☐ Y ☐ N

Yes = 1, No = 0

2.0 Module Interface for Input (47)

2.1 Number of modules used for input from other systems.

☐

Score = 1 + ☐ 2.1

II. METRIC WORKSECTION:

Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the data elements above?
(1-10) _____ (§ If you are unable to evaluate)

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

DATA COMMONALITY CHECKLIST

Form Code: IpPDM.2

LIFE CYCLE PHASE:

PRELIMINARY DESIGN

SOURCE(S):

☐ SYSTEM

NAME: _____

☐ SUBSYSTEM

☐ MODULE

I. DATA COLLECTION WORKSECTION:

SCORE

1.0 Translation Standards (49)

1.1 Have standard data representations or translation standards between representations been established, and are they being complied with?

☐ Y ☐ N

Yes = 1, No = 0

2.0 Translation Performance (50)

2.1 Number of modules used to perform translations.

☐

Score = 1 + ☐ 2.1

II. METRIC WORKSECTION:

Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the data elements above? (1-10) _____ (# If you are unable to evaluate)

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

DATA COMMONALITY

Form Code: IpPDC.1

LIFE CYCLE PHASE:

PRELIMINARY DESIGN

SOURCE(S):

IpPDM.2

☐

SYSTEM

NAME: _____

☐

SUBSYSTEM

☐

MODULE

I. METRIC SUMMARY WORKSECTION:

1. Data Commonality Checklist

SCORE

☐

II. CRITERIA WORKSECTION:

Criteria Value $\frac{\text{Sum of Above Scores}}{\text{No. of Metrics}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the metrics above?
(1-10) _____ (# If you are unable to evaluate)

PREPARED BY: _____

APPROVED BY: _____

DATE: _____

DATE: _____

COMMUNICATION COMMONALITY

Form Code: IpPDC.2

LIFE CYCLE PHASE:

PRELIMINARY DESIGN

SOURCE(S):

IpPDM.1

☐ SYSTEM

NAME: _____

☐ SUBSYSTEM

☐ MODULE

I. METRIC SUMMARY WORKSECTION:

1. Communication Commonality Checklist

SCORE

☐

II. CRITERIA WORKSECTION:

Criteria Value = $\frac{\text{Sum of Above Score}}{\text{No. of Metrics}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the metrics above?
(1-10) _____ (§ If you are unable to evaluate)

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

INTEROPERABILITY

Form Code: IpPDF.1

LIFE CYCLE PHASE:

PRELIMINARY DESIGN

SOURCE(S):

IpPDC.1

IpPDC.2

☐

SYSTEM

NAME: _____

☐

SUBSYSTEM

☐

MODULE

I. CRITERIA SUMMARY WORKSECTION:

1. Data Commonality

2. Communication Commonality

SCORE

☐☐

II. FACTOR WORKSECTION:

Factor Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Criteria}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the criteria above?
(1-10) _____ (§ If you are unable to evaluate)

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

INTEROPERABILITY

Complete this score chart if an application of this set of worksheets is appropriate when products of B3 and C in Analysis Phase become available.

Data Element Number	Answer of Data Element	Data Element Score	Metric Score	Criteria Score	Factor Score
46					
47					
49					
50					

FIRST MEASUREMENT Date _____

Complete this score chart if a second application of this set of worksheets is appropriate for update when products of C1 and C2 in Design Phase become available.

Data Element Number	Answer of Data Element	Data Element Score	Metric Score	Criteria Score	Factor Score
46					
47					
49					
50					

SECOND MEASUREMENT Date _____

INTEROPERABILITY

Complete this score chart if a third application of this set of worksheets is appropriate for update when products of A1, A2, and B1 in Test and Integration Phase become available.

<u>Data Element Number</u>	<u>Answer of Data Element</u>	<u>Data Element Score</u>	<u>Metric Score</u>	<u>Criteria Score</u>	<u>Factor Score</u>
<u>46</u>					
<u>47</u>					
<u>49</u>					
<u>50</u>					

THIRD MEASUREMENT

Date _____

Complete this score chart if a fourth application of this set of worksheets is appropriate for update when products of A1, A2 and B-D1 in Test and Integration Phase become available.

<u>Data Element Number</u>	<u>Answer of Data Element</u>	<u>Data Element Score</u>	<u>Metric Score</u>	<u>Criteria Score</u>	<u>Factor Score</u>
<u>46</u>					
<u>47</u>					
<u>49</u>					
<u>50</u>					

FOURTH MEASUREMENT

Date _____

MODULAR IMPLEMENTATION MEASURE

Form Code: IpDDM.1

LIFE CYCLE PHASE:

DETAIL DESIGN

SOURCE(S):

☐ SYSTEM

NAME: _____

☐ SUBSYSTEM

☐ MODULE

I. DATA COLLECTION WORKSECTION:

SCORE

1.0 Controlling Parameters (87)

1.1 Number of calling sequence parameters that are control parameters. ☐

1.2 Number of calling sequence parameters. ☐

Score = +

2.0 Controlling Input (88)

2.1 Is input passed as calling sequence parameters? ☐ Y ☐ N

Yes = 1, No = 0

3.0 Controlling Output (89)

3.1 Is output data passed back to calling module? ☐ Y ☐ N

Yes = 1, No = 0

4.0 Controlling Return (90)

4.1 Is control returned to calling module? ☐ Y ☐ N

Yes = 1, No = 0

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

MODULAR IMPLEMENTATION MEASURE (Continued)

Form Code: IpDDM.1

LIFE CYCLE PHASE:

SOURCE(S) :

DETAIL DESIGN


SYSTEM

NAME:

SUBSYSTEM

MODULE

I. DATA COLLECTION WORKSECTION (continued):

SCORE

5.0 Share Temporary Storage (91)

5.1 Is temporary storage independent of other modules? ☒ Y ☐ N

Yes = 1, No = 0

II. METRIC WORKSECTION:

$$\text{Metric Value} = \frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$$

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the data elements above?
(1-10) _____ (§ If you are unable to evaluate)

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

MODULARITY

Form Code: IpDDC.1

LIFE CYCLE PHASE:
DETAIL DESIGN

SOURCE(S):

IpDDM.1

- ☐ SYSTEM
☐ SUBSYSTEM
☐ MODULE

NAME: _____

I. METRIC SUMMARY WORKSECTION:

1. Modular Implementation Measure

SCORE

☐

II. CRITERIA WORKSECTION:

Criteria Value $\frac{\text{Sum of Above Scores}}{\text{No. of Metrics}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the metrics above?
(1-10) _____ (§ If you are unable to evaluate)

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

INTEROPERABILITY

Form Code: IpDDF.1

LIFE CYCLE PHASE:

DETAIL DESIGN

SOURCE(S):

IpDDC.1

☐ SYSTEM

NAME: _____

☐ SUBSYSTEM

☐ MODULE

I. CRITERIA SUMMARY WORKSECTION:

1. Modularity

SCORE

☐

II. FACTOR WORKSECTION:

Factor Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Criteria}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the criteria above?
(1-10) _____ (# If you are unable to evaluate)

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

INTEROPERABILITY

Complete this score chart if an application of this set of worksheets is appropriate when products of A1, A2, A3, A4, B and D in Design phase become available.

<u>Data Element Number</u>	<u>Answer of Data Element</u>	<u>Data Element Score</u>	<u>Metric Score</u>	<u>Criteria Score</u>	<u>Factor Score</u>
<u>87</u>					
<u>87</u>					
<u>88</u>					
<u>89</u>					
<u>90</u>					
<u>91</u>					

FIRST MEASUREMENT

Date _____

Complete this score chart is a second (or iterative) application of this set of worksheets is appropriate for update when product of C in coding and check-out phase becomes available.

<u>Data Element Number</u>	<u>Answer of Data Element</u>	<u>Data Element Score</u>	<u>Metric Score</u>	<u>Criteria Score</u>	<u>Factor Score</u>
<u>87</u>					
<u>87</u>					
<u>88</u>					
<u>89</u>					
<u>90</u>					
<u>91</u>					

SECOND MEASUREMENT

Date _____

INTEROPERABILITY

Complete this score chart if a third application of this set of worksheets is appropriate for update when products of B-D3, B-D4 in Test and Integration phase become available.

<u>Data Element Number</u>	<u>Answer of Data Element</u>	<u>Data Element Score</u>	<u>Metric Score</u>	<u>Criteria Score</u>	<u>Factor Score</u>
<u>87</u>		 			
<u>87</u>					
<u>88</u>					
<u>89</u>					
<u>90</u>					
<u>91</u>					

THIRD MEASUREMENT

Date _____

MODULAR IMPLEMENTATION MEASURE

Form Code: IpIMM.1

LIFE CYCLE PHASE:

IMPLEMENTATION

SOURCE(S):

- ☐ SYSTEM
☐ SUBSYSTEM
☐ MODULE

NAME: _____

I. DATA COLLECTION WORKSECTION:

SCORE

1.0 Controlling Parameters (87)

1.1 Number of calling sequence parameters that are control parameters. ☐

1.2 Number of calling sequence parameters. ☐

Score = +

2.0 Controlling Input (88)

2.1 Is input passed as calling sequence parameters? ☐ Y ☐ N

Yes = 1, No = 0

3.0 Controlling Output (89)

3.1 Is output data passed back to calling module? ☐ Y ☐ N

Yes = 1, No = 0

4.0 Controlling Return (90)

4.1 Is control returned to calling module? ☐ Y ☐ N

Yes = 1, No = 0

II. METRIC WORKSECTION:

Metric Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Data Elements}}$

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the data elements above? (1-10) _____ (Ø If you are unable to evaluate)

IV. INSPECTOR'S COMMENTS:

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

<u>MODULARITY</u>		
		Form Code: <u>IpIMC.1</u>
LIFE CYCLE PHASE: IMPLEMENTATION		SOURCE(S): <u>IpIMM.1</u>
☐ SYSTEM ☐ SUBSYSTEM ☐ MODULE	NAME: _____ _____ _____	
I. <u>METRIC SUMMARY WORKSECTION:</u> 1. Modular Implementation Measure		SCORE ☐
II. <u>CRITERIA WORKSECTION:</u> Criteria Value $\frac{\text{Sum of Above Scores}}{\text{No. of Metrics}}$		☐
III. <u>EVALUATION WORKSECTION:</u> What is your evaluation of the reviewed products based on the metrics above? (1-10) _____ (§ If you are unable to evaluate)		

PREPARED BY: _____ APPROVED BY: _____
 DATE: _____ DATE: _____

INTEROPERABILITY

Form Code: IpDMF.1

LIFE CYCLE PHASE:

IMPLEMENTATION

SOURCE(S):

IpDMC.1

☐ SYSTEM

NAME: _____

☐ SUBSYSTEM

☐ MODULE

I. CRITERIA SUMMARY WORKSECTION:

1. Modularity

SCORE

☐

II. FACTOR WORKSECTION:

Factor Value = $\frac{\text{Sum of Above Scores}}{\text{No. of Criteria}}$

☐

III. EVALUATION WORKSECTION: What is your evaluation of the reviewed products based on the criteria above?
(1-10) _____ (Ø If you are unable to evaluate)

PREPARED BY: _____ APPROVED BY: _____

DATE: _____ DATE: _____

INTEROPERABILITY

Complete this score chart if an application of this set of worksheets is appropriate when products of A and B in Coding and Checkout Phase become available.

Data Element Number	Answer of Data Element	Data Element Score	Metric Score	Criteria Score	Factor Score
<u>87</u>					
<u>87</u>					
<u>88</u>					
<u>89</u>					
<u>90</u>					

FIRST MEASUREMENT

Date _____

Complete this score chart if a second application of this set of worksheets is appropriate for update when products of B-D2 in Test and Integration Phase becomes available.

Data Element Number	Answer of Data Element	Data Element Score	Metric Score	Criteria Score	Factor Score
<u>87</u>					
<u>87</u>					
<u>88</u>					
<u>89</u>					
<u>90</u>					

SECOND MEASUREMENT

Date _____

INTEROPERABILITY

Complete this score chart if a third application of this set of worksheets is appropriate for update.

<u>Data Element Number</u>	<u>Answer of Data Element</u>	<u>Data Element Score</u>	<u>Metric Score</u>	<u>Criteria Score</u>	<u>Factor Score</u>
<u>87</u>					
<u>87</u>					
<u>88</u>					
<u>89</u>					
<u>90</u>					

THIRD MEASUREMENT

Date _____

ND