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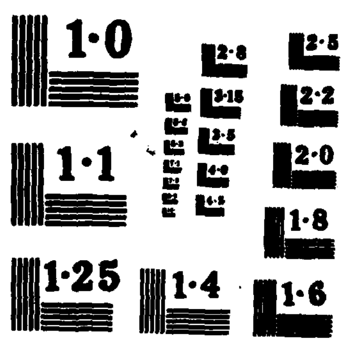
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INTERACTIVE RISK ANALYSIS AND DEVELOPMENT OF STANDARDIZED FACTORS

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January 1984

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This report consists of two parts--interactive risk analysis and standardized factors for risk analysis.

a. Part I presents a brief description of a computer program which is available to perform calculations needed in a risk analysis. The program allows a user to estimate the risk associated with any number of variables and to display the distribution of any arithmetic (~~addition, subtraction, and/or multiplication~~ +, −, and/or ×) combination of the variables. The mode of operation is designed to be similar to a calculator. Rather than entering in a single number, the user must supply a low, most likely, and high for each variable. Variables can be added, subtracted, or multiplied; intermediate calculations can be stored; and the distribution of the total can be displayed at any time.

b. Part II discussed the development of a microcomputerized statistical price risk

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analysis model which allows a user to estimate a distribution of total cost using completely objective input. The objective characteristics of a contract which introduce cost risk are identified, and the standardized factors associated with these characteristics are defined and applied to a cost breakdown. The use of standardized factors has several advantages over subjective estimates of risk: the cost risk analysis is objective rather than subjective; estimates of risk are independent of biases and experience; risk analysis results are comparable between contracts; standardized factors provide documentation for the cost risk analysis; oversights are eliminated; and standardized factors allow for the incorporation of many different points of view.

TABLE OF CONTENTS

INTERACTIVE RISK ANALYSIS

ABSTRACT

This report presents a brief description of a computer program which is available to perform calculations needed in a risk analysis. This program is one which allows a user to estimate the risk associated with any number of variables and to display the distribution of any arithmetic (addition, subtraction, and (or) multiplication) combination of the variables.

The mode of operation is designed to be similar to a calculator. Rather than entering in a single number, the user must supply a low, most likely and high for each variable. Variables can be added, subtracted, or multiplied; intermediate calculations can be stored; and the distribution of the total can be displayed at any time.

INTRODUCTION

Many point estimates of totals (e.g., project completion time, cost of weapon systems, etc.) involve simple addition, subtraction and multiplication which can be performed on a hand calculator. Commonly, point estimates are made for each subcomponent and totals are calculated. Problems arise when there is a lack of information or there is an inability to accurately forecast the subcomponent. The affect on the total is captured by risk analysis.

To determine the amount of uncertainty in a total, an analyst would not only estimate the most likely value for each subcomponent but also estimate the probability of different outcomes for each subcomponent. From this information, probabilities of different totals could be calculated. This is exactly what is done in statistical risk analysis. The only difference is in the way that an analyst supplies information about the uncertainty in subcomponents and how this information is used to make probability statements. The complexity of the calculations required make the use of a computer almost a necessity.

Most computer programs available to assist an analyst in performing calculations required in a risk analysis are designed with a particular area of application in mind or require a relationship between the different variables involved to be defined in advance. Either of these requirements limit the flexibility of the software and hence applications.

The computer program discussed in this report was designed such that:

- o no formal training is required on the modeling technique employed,
- o no mathematical equations need to be defined,
- o the operation is similar to a calculator, and
- o the results can be displayed immediately.

The program can be used in numerous areas of applications including, but not limited to, quality control, scheduling, inventory control, and cost analysis.

INTERACTIVE MODEL

The computer program being discussed, accepts three estimates for each subcomponent and allows the user to ny sequence of addition,

three points required are

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EXAM

It order to execute the i

instructions should be followed:

1. Turn on the machine.

2. Insert Diskette.

3. Respond to the quest
for the drive number

4. To the prompt A> type

5. Make sure the shift
must be in capital le

6. To the prompt OK, typ

7. To the prompt OK, typ

8. At this point,
documentation for
the question, "Do you
type, "YES", a brief
will appear. A br
follow while the
necessary tables to

8. From this point on
user for the necess
possible choices in p

In order to illustrate t

example will be used. The pro

together and then to multiply

for the three variables show

Variable	Low
1	300
2	100
3	.1

The actual input and out

The use of the STO command w

how intermediate calculations c

portion is the user input.

EXAMPLE

It order to execute the interactive risk program, these instructions should be followed:

1. Turn on the machine.
2. Insert Diskette.
3. Respond to the question on the screer which asks for the drive number (usually A).
4. To the prompt A> type MBASIC.
5. Make sure the shift key is locked down (all input must be in capital letters).
6. To the prompt OK, type LOAD "RISK.BAS".
7. To the prompt OK, type RUN to begin the program.
8. At this point, the computer will display documentation for the program, followed by the question, "Do you want instructions?" If you type, "YES", a brief explanation of the commands will appear. A brief waiting period will follow while the computer is loading the necessary tables to begin the calculations.
8. From this point on, the computer will prompt the user for the necessary command by showing the possible choices in parentheses.

In order to illustrate these instructions, a simple example will be used. The problem is to add two variables together and then to multiply by a third variable. The data for the three variables is shown below.

Variable	Low	Most Likely	High
1	300	400	600
2	100	300	900
3	.1	.3	.5

The actual input and output is shown on the next page. The use of the STO command was used only to demonstrate how intermediate calculations can be stored. The underlined portion is the user input.

```
COMMAND (mul, add, sub, dis, inp, sto, rcl, con, bye)
? INP

Low, Most Likely, and High?  300,400,600

COMMAND (mul, add, sub, dis, inp, sto, rcl, con, bye)
? ADD

COMMAND (inp, rcl)?  INP

Low, Most Likely, and High?  100,300,900

COMMAND (mul, add, sub, dis, inp, sto, rcl, con, bye)
? STO

Enter Numeric Storage Location?  21

COMMAND (mul, add, sub, dis, inp, sto, rcl, con, bye)
? INP

Low, Most Likely, and High?  .1,.3,.5

COMMAND (mul, add, sub, dis, inp, sto, rcl, con, bye)
? MUL

COMMAND (inp, rcl)?  RCL

Enter Numeric Storage Location?  21

COMMAND (mul, add, sub, dis, inp, sto, rcl, con, bye)
? DIS
```

Most Likely Value = 1.9807731D+02
Mean = 2.4067632D+02

PROBABILITY OF EXCEEDING	TOTAL VALUE
0.01	5.0238730D+02
0.05	4.1390276D+02
0.10	3.6897600D+02
0.15	3.3972252D+02
0.20	3.1715733D+02
0.25	2.9832728D+02
0.30	2.8186660D+02
0.35	2.6701941D+02
0.40	2.5331504D+02
0.45	2.4043296D+02
0.50	2.2813737D+02
0.55	2.1624097D+02
0.60	2.0458262D+02
0.65	1.9301027D+02
0.70	1.8136491D+02
0.75	1.6945995D+02
0.80	1.5704716D+02
0.85	1.4374557D+02
0.90	1.2885224D+02
0.95	1.1061040D+02
0.99	8.8013517D+02

SUMMARY

An interactive risk analysis program, which is not tied to a particular application and does not require modeling knowledge of the user, has been described in this paper. The ability to perform risk calculations in a manner similar to using a calculator makes the program easy to use and adds flexibility.

The program is currently available in MBASIC for micro-computers and is also available through COPPER IMPACT. For more information concerning the program or its usage contact the author at Pel, Inc., P. O. Box 80784, Baton Rouge, Louisiana 70898, or The Business Research Management Center, AFBRMC/RDCB, Wright-Patterson AFB, Ohio 45433.

The development of this program was supported by the Air Force Business Research Management Center.

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1. McNichols, G. R. and Moyer, R., "The Navy's Use of Analytic Procedures for Treating Cost Uncertainty in Parametric Costing," Proceedings of the 13th Annual Meeting of the Southeastern Chapter, The Institute of Management Science, 1977.

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PART II - STANDARDIZED FACTORS FOR RISK ANALYSIS

STANDARDIZED FACTORS FOR RISK ANALYSIS

I. Introduction

Risk analysis has received a great deal of attention in the recent past, especially in the Department of Defense. Part of the research has been to determine the probability distribution of the total cost for a weapon system. That is, the distribution for what the total cost would be for a contract, if reasonably efficient and economical practices are maintained in the contractor's and government's management and operation. The analysis has been to break the total cost down into parts which allow for the assessment of the risk involved and to combine these parts to obtain the distribution of the total cost. This type of risk analysis is sometimes referred to as cost risk analysis.

Cost risk analysis has in the past relied heavily on subjective estimates. This introduces several variables into the analysis which make the results difficult to interpret. Such things as analyst's experience and personal biases lead to results which are difficult to substantiate and are therefore often disregarded.

In a cost risk analysis for a major weapon system, there are several characteristics of a contract which indicate the extent of the cost risk. Although these have always been recognized, the degree to which they introduce risk in a contract has varied greatly.

The purpose of this paper is to present the results of research aimed at capturing the objective characteristics of a contract which introduce cost risk. This is accomplished by defining standardized factors associated with each of the objective characteristics and applying these factors to a cost breakdown. Using statistical theory, the distribution of total cost is then estimated.

The use of standardized factors has several advantages over subjective estimates of risk. These include:

- The cost risk analysis is objective rather than subjective.
- Estimates of risk are independent of biases and experience.
- Risk analysis results are comparable between contracts.
- Standardized factors provide documentation for the cost risk analysis.
- Oversights are eliminated.
- Standardized factors allow for the incorporation of many different points of view.

A model which utilizes standardized factors is discussed in the next section.

II. Standardized Factor Model

The standardized factor model discussed here takes a Most Likely cost estimate of subcomponent costs and overhead factors and applies risk factors determined by objective characteristics of a contract to determine the distribution of the total cost. This section presents a cost breakdown, standardized factors based on contract characteristics and the application of these factors to the cost elements.

The total cost breakdown used in this model is shown in Table 1. The material breakdown was chosen because of the differing amounts of risk for raw materials, purchased parts, and subcontracted material. The material and interdivisional transfer dollars were further broken out by the type of Purchase Order (PO) in effect at the time of the analysis. This breakdown is according to the dollars in each of the following categories:

- No purchase Order issued
- Purchase Order issued as fixed price
- Purchase Order issued as incentive contract
- Purchase Order issued as cost type contract

Only raw material was further subdivided into critical and non-critical material. The critical material prices were considered to be much more volatile and hence introduces more risk.

The cost estimates for this model are the Most Likely cost and overhead factors for the contract under consideration (Table 1). This along with some objective characteristics constitute the elements of a contract from which the risk analysis is performed. The specific standardized factors used are based on the objective characteristics of a contract as shown in Tables 2 and 3. Note that both Low and High values are given for each of the standardized factors. The purpose of the Low and High values are to provide a three point estimate of each of the cost elements.

Table 1

DATA INPUT

(Most Likely Cost)

			CRITICAL	NON-CRITICAL
Material	Raw Material	Not on P. O.	$______	$______
		FP --- P. O.	$______	$______
		FPI - P. O.	$______	$______
	Purchased Parts	Not on P. O.	$______	
		FP --- P. O.	$______	
		FPI - P. O.	$______	
	Subcontracts	Not on P. O.	$______	
		FP --- P. O.	$______	
		FPI - P. O.	$______	
		Cost - Plus		
Material Overhead	______%			
Interdivisional Transfer		Not on P. O.	$______	
		FP --- P. O.	$______	
		FPI - P. O.	$______	
		Cost - Plus		
Manufacturing	Labor	$______		
	Overhead	______%		
Engineering	Labor	$______		
	Overhead	______%		
General and Administrative	______%			
Other Cost	$______			

Table 2
STANDARDIZED FACTORS

RAW MATERIAL

	CRITICAL		NON-CRITICAL	
	Low	High	Low	High
Not on P. O.	.9	1.2	.92	1.15
FP --- P. O.	.97	1.03	.98	1.02
FPI - P. O.	.97	1.03	.98	1.02

PURCHASED PARTS

	Low	High
Not on P. O.	.92	1.2
FP --- P. O.	.95	1.05
FPI - P. O.	.98	1.02

SUBCONTRACTS

	Low	High
Not on P. O.	.95	1.2
FP --- P. O.	.95	1.05
FPI - P. O.	.98	1.02
Cost Plus	.95	1.1

INTERDIVISIONAL TRANSFER

	Low	High
Not on P. O.	.95	1.2
FP --- P. O.	.95	1.05
FPI - P. O.	.98	1.02
Cost Plus	.95	1.1

Table 3
STANDARDIZED FACTORS

% of Most Likely Low	High	
		Union - Status of Union Agreement
.95	1.1	1. None
.99	1.02	2. Agreement for duration
.98	1.03	3. 90% of duration
.98	1.03	4. 80% of duration
.98	1.04	5. 50% of duration
.96	1.08	6. 30% of duration
		FPRA - Status of FPRA
1.	1.	1. FPRA negotiated
.96	1.04	2. Total dollar impact of rate variance exceeds 5% of proposed cost
.98	1.02	3. Total dollar impact of rate variance does not exceed 5% of proposed cost
		Inflation - Projected Inflation
1.	1.	1. Contract includes EPA clause
.99	1.01	2. No EPA - mandated inflation less than or equal to field recommendations
.97	1.03	3. No EPA - mandated inflation more than field recommendations
		Period - Period of Performance
1.	1.	1. 1 year
.97	1.03	2. 2 to 3 years
.94	1.06	3. 4 to 5 years
.88	1.12	4. More than 5 years
		Standards - Standards
.98	1.05	1. Firm standards, well documented learning curves
.95	1.07	2. 80% firm standards less reliable variance data due to limited history
.95	1.1	3. First production, limited standards and variance data
.93	1.15	4. Model shop operation or FSED. Tool design not yet determined
		Design - Design of Maturity
.98	1.05	1. Firm design, 10/90 mix of changes and sustaining effort
.95	1.07	2. 30/70 mix of changes and sustaining effort
.95	1.1	3. 50/50 mix of changes and sustaining effort
.93	1.15	4. New program, design not determined, little historical basis to estimates

For instance, if the Most Likely value for a cost element is $100 and a standardized factor applied to this cost element is Low = .9 to High = 1.1 then the three point estimate for the cost element would be Low = $90, Most Likely = $100 and High = $110. These Low and High factors are expressed as percentages of the Most Likely and represent values for which there is only a 1% chance of being lower or higher, respectively.

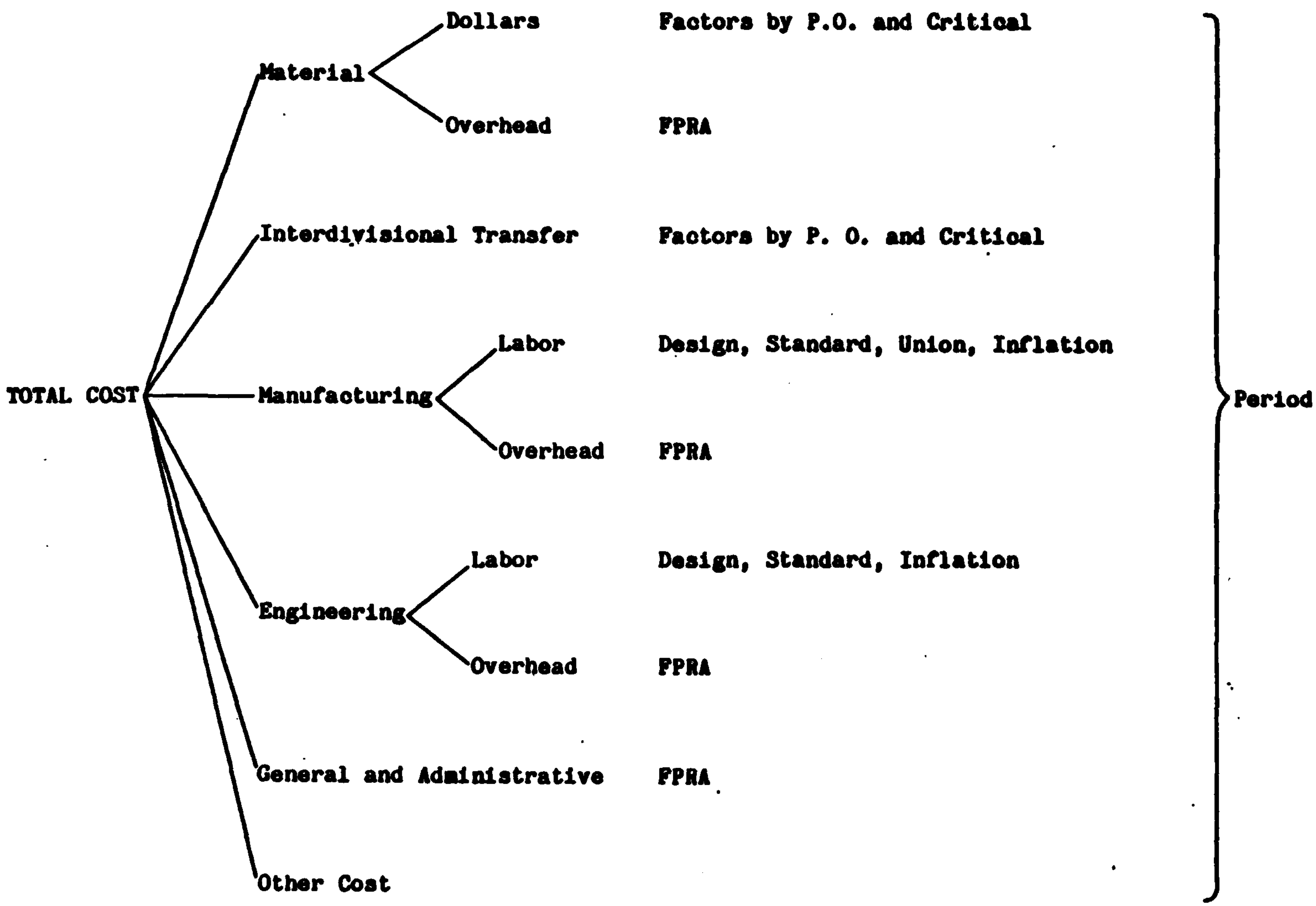
The numbers shown in Tables 2 and 3 form the basis for the risk analysis and show the importance of each factor. The specific numbers shown here are an initial set. See Section III for a discussion of evolution of these values.

The factors given in Table 2, apply one-for-one to the cost breakdown shown for material and interdivisional transfer. The factors in Table 3 effect more than one cost element. The specific application of these factors to the cost elements is shown in Table 4.

The computations necessary to apply the factors to the cost elements and then to determine the distribution of the total cost have been computerized. The methodology used is the method of moments [3, 5] by which the individual distributions of the cost elements are combined to determine the distribution of the total cost.

The computer model allows the user to input the Most Likely cost estimates and the Low and High for each factor. The specific values for the Low and High are selected from those in Tables 2 and 3 based on the particular characteristic of the contract. The other value need not be

Table 4
<u>APPLICATION OF STANDARDIZED FACTORS</u>



entered. This method of input was chosen to avoid imbedding the standardized factors into the computer program and hence fixing them at a single point of time.

III. Application

There are several topics which should be addressed when a standardized factor model is being discussed. These topics are:

- o How should the model be applied?
- o How should the results be interpreted?
- o How could the model be improved in the future?

The application of the model presented here can be of most benefit in two areas. The first is in the documentation and capturing of the risks involved in a contract. The utilization of this information can provide a means of demonstrating the amount of risk involved and provide support for negotiation targets set in pre-negotiation briefings. The second area of application is in the area of structuring incentive contracts [7]. A discussion of this application is presented in Appendix A.

When management is presented with the results of a risk analysis, they should be concerned with several underlying assumptions. Namely:

- o What factors have been considered?
- o To what extent do these factors affect risk?
- o How do these results compare with other risk analysis?

IV. Example

The computer model is currently programmed in MBASIC and is available for a DEC-Rainbow 100 microcomputer. It is executed by:

1. Turn on the machine.

2. Insert Diskette.

3. Respond to the question on the screen which asks for the drive number (usually A).

4. To the prompt A> type MBASIC.

5. Make sure the shift key is locked down (all input must be in capital letters).

6. To the prompt OK, type LOAD "RISKFAC.BAS".

7. To the prompt OK, type RUN. From this point on the computer will prompt the user for the Most Likely Costs and the standardized factors. At the end of each line requiring more than one number, the specific number of entries required is shown. These numbers must separated by commas. For instance, the prompt for the purchased parts is:
   PURCHASED PARTS (6#S)? The user should type:
   .92,1.2,.95,1.05,.98,1.02

8. After all of the input has been entered, the Low, Most Likely and High Values are printed for each of the cost elements after applying the standardized factors according to Table 4.

9. The distribution of the total cost is then printed.

A specific set of data has been used for presenting the form of the input and output. See appendix B.

V. Summary

The model presented in this paper is an attempt to objectively measure the cost risk in a contract. The success of this model will depend on the extend to which the factors are modified as additional information is acquired.

Management should be made aware of the specific factors included, the level of risk associated with each factor, and how the factors are applied to Most Likely cost estimates to obtain the total cost risk. This will facilitate the use of the model and the understanding of the results. As management becomes accustomed to this type of analysis, they will be able to evaluate the cost risk in a contract, and possibly be able to suggest future improvements.

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Appendix A [7]

The results of a cost risk analysis is the probability of exceeding different total costs for a contract. Numerous methods are available for the determination of these probabilities [1, 3, 4, 5, 6]. An example end-product of a risk analysis is presented in Figure 1.

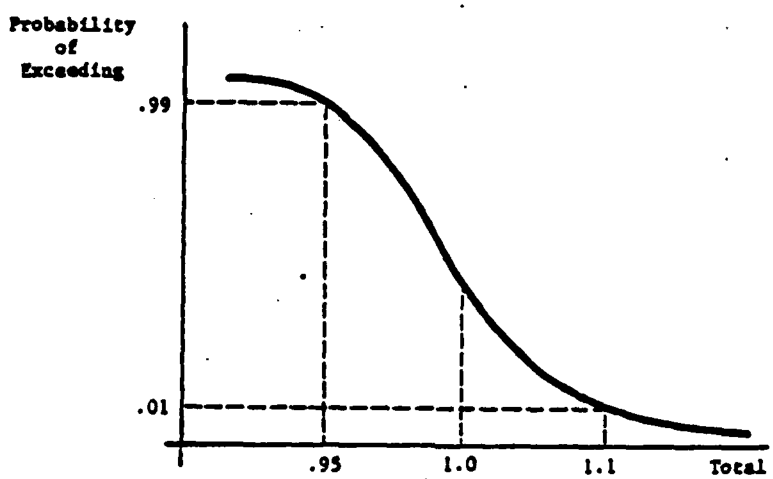

Figure 1

In this example, there is a 1% probability of exceeding 1.1 million and the most likely total cost is $1 million. In other words, there is a 1% probability of a 10% (1.1M) over run or a 5% (.95M) under run of the most likely total cost. The variation between .95 and 1.1 million is not under the control of either the contractor or the government. Contractor efficiency in the establishment of distribution shown has been assumed at a given level. Improved or superior performance will cause a shift of the curve to the left or right but not change the risk involved.

Two contract types are discussed here. The first is a Firm Fixed Price (FFP). For a FFP contract the price is set at a fixed value at the time of negotiations. Any over runs or under runs are absorbed by the contractor. The price negotiated is the total obligation of the government. The second contract type is more complicated in that several factors must be negotiated. A Fixed Price Incentive (FPI) contract is a way of tieing profit to cost. A target cost and target profit are established along with a share ratio and a ceiling cost. A FPI contract is illustrated below in Figure 2.

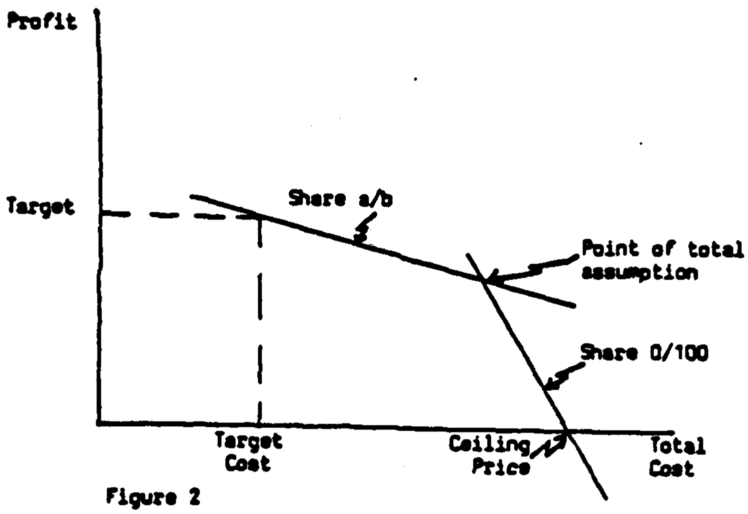

Figure 2

In this example, if the cost at the end of the contract is equal to the Target Cost, then the contractor is paid the Target Profit. If the cost over runs or under runs the Target Cost, then the government will pick up "a%" and the contractor will have "b%" additional or less profit. At the "point of total assumption", the contractor will pay 100% of any excessive cost from profit. The ceiling price is the maximum government obligation. Note that the "Total Price" is equal to the cost plus profit.

A contract with estimated cost as shown in Figure 1 is a candidate for use of an incentive contract. Generally speaking incentive contracts have been written so that they offer the contractor a real incentive to meet or better the cost objectives of a contract (the target cost). An incentive contract also offers the contractor rewards commensurate with the risks he assumes.

A FFP type of contract usually incorporates a premium for the risk. The sharing of risk is negotiated at the time of writing the contract rather than based on the outcome of total cost as in an incentive contract.

Both the FPI and FFP contract structures are discussed in great detail in the Incentive Contracting Guide [2]. The discussion which follows shows how an incentive contract and fixed price contracts can be structured from information obtained from a cost risk analysis.

Figure 3, 4, and 5 give examples of different amounts of risk and shows the appropriate contract type for each. That is, if the risk is small a FFP contract is appropriate; if the risk is in a medium range then a FPI contract is appropriate; and if the risk is large, then a Cost Plus Fixed Fee (CPFE) contract is appropriate.

The structuring of a fixed price contract is achieved by taking expected cost and adding target profit. Since there is a small amount of risk, the fixed price will provide profit for the contractor over the entire range of cost. Furthermore, the amount paid by the government is fixed. If the procedure given below for incentive contracts is used, the government's share would be almost zero. In Figure 3, the straight line represents the trade off between cost and profit imposed by a FFP contract.

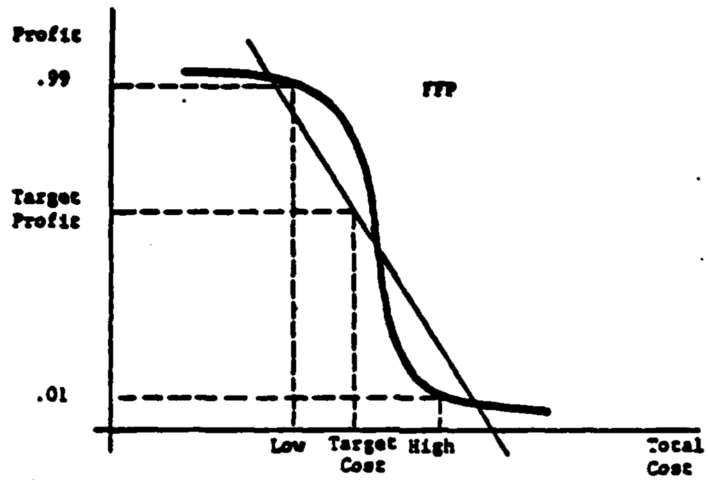

Figure 3

Figure 4 places on a single graph the probability of exceeding different costs and an FPI contract structure. Currently the target cost being used in structuring incentive contracts is the expected total cost from the risk analysis. The Target Profit is established using the Weighted Guidelines which incorporates a factor for risk. The Warranted Profit is the Target Profit less the risk factor. The point of total assumption is currently assumed to be the cost for which there is only a 1% chance of exceeding. Each of these points are identified in Figure 4. The Share Ratio can then be calculated as:

$$\text{Share Ratio} = \frac{\text{Target} - \text{Warranted}}{1\%\ \text{Cost} - \text{Target Cost}}$$

The ceiling cost is then:

$$\text{Ceiling Cost} = 1\%\ \text{Cost} + \text{Warranted Profit}$$

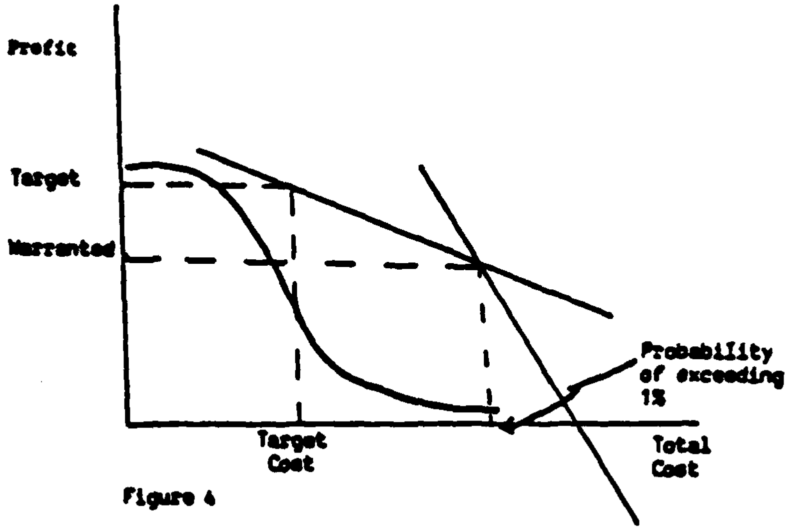

Figure 4

The thought process used in making the choices of Target Cost and the point of total assumption were that the target profit should be an average profit rather than a most likely profit and thus should be based on the expected cost. Furthermore, due to the common skewness of the total cost distribution the expected would be a more conservative estimate of the resulting total cost. The warranted profit is the desired profit if all risk is removed. Here we assume that a probability of 1% of exceeding has removed the risk.

For a cost type contract, the risk is so great that the government's share is approximately 100%. Figure 5 would imply that the entire cost is paid by the government and the contractor's fee is not based on the amount of cost.

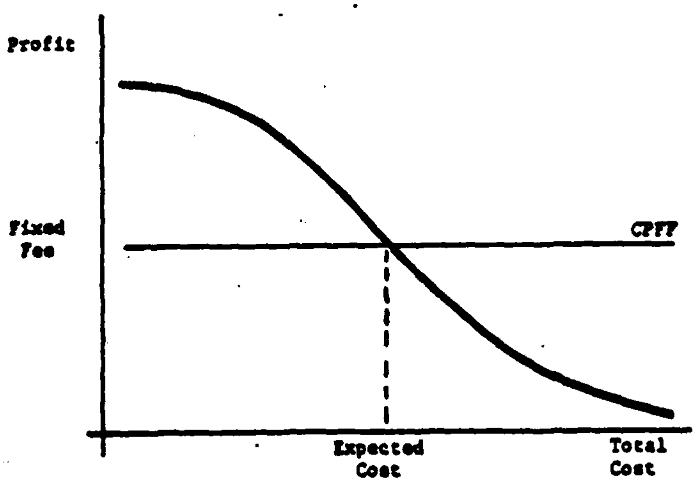

Figure 5

This appendix has tried to show the importance of using risk analysis in the structuring of incentive type contracts. Probabilities from a risk analysis such as the ones shown in Figure 1 can be used to build a case for a particular contract type and to develop targets, shares and ceilings. It is important to use good judgment concerning the contract structure and to use risk analysis as only one input into the decision making process.

Appendix B

Sample Run

In order to illustrate the program for standardized factors in a risk analysis, a sample run using a specific set of data is presented on the next two pages. The Most Likely Cost Estimates were entered first, followed by the factors which were obtained from Tables 2 and 3 of this report. The actual input and output are shown in this appendix. The user input portions are underlined.

RUN

MOST LIKELY COST ESTIMATES

RAW MATERIAL - NOT ON P O (CRITICAL AND NON-CRITICAL)(2#S)? 0,2100

RAW MATERIAL - FP - P O (CRITICAL AND NON-CRITICAL)(2#S)? 0,2100

RAW MATERIAL - FPI - P O (CRITICAL AND NON-CRITICAL) (2#S)? 0,0

PURCHASED PARTS (NOT ON P O, FP - P O, FPI - P O) (3#S)? 2100,0,0

SUBCONTRACT (NOT P O, FP - P O, FPI - P O, COST)(4#S)? 0,0,0,0

MATERIAL O H? .05

INTERDIVISIONAL TRANS (NOT P O, FP - P O, FPI - P O, COST)(4#S)? 1700,0,0,0

MANUFACTURING LABOR? 2200

MANUFACTURING OVERHEAD? 1.50

ENGINEERING LABOR? 200

ENGINEERING OVERHEAD? 1.02

G & A? .05

OTHER COST? .0

FACTOR INPUT

R.M. NOT P O (4#S)? .9,1.2,.92,1.15

R.M. FP-P O (4#S)? .97,1.03,.98,1.02

R.M. FPI- P O(4#S)? .97,1.03,.98,1.02

PURCHASED PARTS (6#S)? .92,1.2,.95,1.05,.98,1.02

SUBCONTRACT (8#S)? .95,1.2,.95,1.05,.98,1.02,.95,1.1

I.T.(8#S)? .95,1.2,.95,1.05,.98,1.02,.95,1.1

UNION? .96,1.08

FPRA? .98,1.02

INFLATION? .97,1.03

PERIOD? .88,1.12

STANDARDS? .93,1.15

DESIGN? .93,1.15

MATERIAL	LOW	5566.644179311421	M.L.	6358.09418399163	HIGH	7275.821813992257
MAT. O.H.	LOW	1.029847185704748	M.L.	1.049444370878843	HIGH	1.07159889554489
I.T.	LOW	1511.257444317504	M.L.	1717.027118581446	HIGH	2105.22490487645
MGT.LAB.	LOW	1886.121254027108	M.L.	2246.495793508889	HIGH	2826.59842681395
ENGR. LAB.	LOW	171.5284067229302	M.L.	202.778763065192	HIGH	252.6514798419583
MGT. O.H.	LOW	2.452336963029737	M.L.	2.498388484843897	HIGH	2.55183826429185
ENGR. O. H.	LOW	1.995934713350177	M.L.	2.005370273205126	HIGH	2.07637889931253
G &A	LOW	1.029847185704748	M.L.	1.049444370878843	HIGH	1.07159889554489
OTHER	CONSTANT	0				

Most Likely Value = 1.5243031D+04
Mean = 1.5311071D+04

PROBABILITY OF EXCEEDING	TOTAL VALUE
0.01	1.707489D+04
0.05	1.655889D+04
0.10	1.627939D+04
0.15	1.608953D+04
0.20	1.593815D+04
0.25	1.580812D+04
0.30	1.569136D+04
0.35	1.558331D+04
0.40	1.548103D+04
0.45	1.538244D+04
0.50	1.528588D+04
0.55	1.518994D+04
0.60	1.509323D+04
0.65	1.499429D+04
0.70	1.489138D+04
0.75	1.478219D+04
0.80	1.466333D+04
0.85	1.452911D+04
0.90	1.436815D+04
0.95	1.414938D+04
0.99	1.381764D+04

END

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DTIC