Apr 1st, 8:00 AM

Decision Support in the Source Selection Process

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ABSTRACT

The complexity of federal acquisition is increasing. Our ability as humans to
mentally assimilate new laws, regulations, policies, and procedures into the
existing body of knowledge in the acquisition field has already been surpassed.
This paper will explore an emerging technique, known as the Analytic Hierarchy
Process (AHP), that promises to help acquisition managers make rational
decisions in the face of this increasing complexity. The advent of inexpensive
microcomputers and powerful new decision support systems (DSS) make this
possible. One such software product, Expert Choice, is examined and applied to
a "typical" complex Defense Department decision--the task of selecting a source
in competitive negotiations. Using Expert Choice, the author developed a DSS
to "conduct" an hypothetical source selection. Selection criteria and alterna-
tive proposals were incorporated into the model, as were the judgments made by
technical, cost, and management evaluation teams. The DSS synthesizes the
judgments into a comprehensive ranking of the proposals and, perhaps most
importantly, helps source selection team members communicate their findings to
one another and to the Source Selection Authority. The advantages of using
decision support systems to help both government and industry decision makers
in a variety of complex decision scenarios are discussed.

INTRODUCTION

Decision making is the most important and difficult function managers perform.
In the private sector, the difference between a good and bad decision can mean
the difference between success or failure of the company itself. Within the
government, where profit is not a direct consideration, decisions deal with a
wide range of topics, from the existence of social programs to the development
of space defense systems. In both cases, the problems faced by management
involve multiple criteria and alternative choices. These situations are, by
definition, complex decisions.

This paper deals with one such complex decision--the selection of the "best"
source to develop and build an Air Force tactical cockpit television system.
The "best" source can be determined only after evaluation of several competing
contractor proposals with respect to a number of criteria. The contractor (or
contractors in the case of competition) selected to receive the award must be
capable of meeting the minimum needs of the Government, but should also be
ranked the highest, considering all the criteria and subcriteria, with respect
to all the other proposals.

In the case of the source selection to be discussed here, the process involves
six contractors, five primary criteria and twenty subcriteria. Obviously, this
situation is much too complex to handle mentally, without the aid of at least a
manual scoring and ranking system. The advent of inexpensive microcomputers

and, more recently, powerful decision support systems software now offer private and public decision makers the opportunity to make better decisions. Just how this can be done, and a specific example of an Air Force source selection using the decision support system developed by the author, comprise the content of this paper.

THE SOURCE SELECTION PROCESS

The term "source selection" is used in the context of competitively negotiated acquisitions conducted by systems contracting activities, as distinguished from small, routine purchases and those awarded using the sealed bidding method. Systems source selections can take several months, and usually involve a number of experts from a variety of functional areas. These functional experts are taken from existing, ongoing programs and formed into evaluation teams, where they scrutinize contractors' proposals, rank them against criteria set forth in the request for proposals, and recommend to a higher authority the offeror who should receive the contract award.

For the duration of the source selection, the ongoing programs from which the functional specialists are drawn suffer from the absence of these key people. The loss to these programs can often be measured in terms of schedule delays, increased program costs, loss of morale and loss of management control. It is obviously in the best interests of all concerned to conduct source selections as efficiently and quickly as possible, yet Government regulations are unlikely to change in the near future regarding the procedures that must be followed in source selections. How, then, can the process be accelerated and improved? Decision support systems provide one answer.

Automation of administrative workload, such as document preparation and analysis of cost proposals with electronic spreadsheets, offers immediate returns in the clerical and some technical areas, yet little has been done to assist the actual decision maker. However, the Analytic Hierarchy Process, implemented via the DSS presented here, offers great potential for improving the quality and timeliness of source selection decisions.

As stated by Dr. Stanley N. Sherman, "Source Selection and price level determination are decisions which must be made through the judgment of managers, and their objectivity in this regard is subject to question."(Sherman). In an attempt to ensure this objectivity, within the Air Force a Source Selection Authority (SSA) is a senior manager appointed to oversee the entire source selection process and make the final award decision. A Source Selection Advisory Committee (SSAC), made up of middle and upper managers such as the Program Manager and the Principal Contracting Officer, advise the SSA of the progress of the source selection, the evaluation results, the ranking of the contractors, etc. The Source Selection Evaluation Board (SSEB) reports to the SSAC and is made up of teams of functional specialists such as project engineers, cost analysts, contract negotiators, production specialists, and auditors, who examine the specific technical, cost, management, and other areas of the contractors' proposals, and compare the proposals to the criteria stated in the request for proposals to arrive at a final score and ranking for each offeror. The SSEB presents its findings to the SSAC, which examines and verifies the results, submits the final report to the SSA, and briefs the SSA on its recommendations. The SSA then makes the final award decision.

In most cases, the scoring, ranking, and assimilation of scores for an overall evaluation is done manually. For a major system contract, the selection process can take months. Simply keeping track of critical judgments and formulating briefings for the SSA and other senior managers is extremely difficult and time consuming. Using a hypothetical source selection scenario, the following sections will demonstrate how a decision support system can help keep source selection under control, accelerate the process, and greatly simplify the task of organizing and communicating information. Whether the decision is objective, or is based on subjective, political factors, is a matter of debate. The DSS presented below can be used to isolate _all_ the

variables that affect the source selection decision, including political factors.

THE TACTICAL TELEVISION SENSOR (TTVS)

The TTVS is a hypothetical Air Force program that will be used to illustrate the DSS. The acquisition is for the fabrication and test of a production prototype TV sensor system for various tactical aircraft. Award will be based on an integrated assessment of the criteria ranked below in descending order of relative importance. Subcriteria, not ranked as yet, are listed under each primary criterion:

1. Technical Approach

   Resolution

   Signal to noise ratio

   Definition of video/sync/power

   Blooming of charge transfer device

   Operation at specific temperatures

2. Contractor Capability

   Contractor experience

   Technical/engineering team

   Plans to meet schedule, workaround

3. Cost

   Realism

   Reasonableness

   Completeness

4. Past Performance

   Technical

   Cost

   Schedule

5. Management Approach

   Program Management

   Cost Control

   Schedule Control

   Problem Solving Ability

   Hardware Integration Ability

   Subcontractor/Vendor Management

The source selection process normally involves assigning weights to the criteria, evaluating each proposal with respect to each criterion, multiplying

the scores by the weights, and compiling a rank-ordered list for the SSA. Cost is normally not scored in this manner, since discussions and negotiations usually result in changes to cost. The DSS approach does provide the flexibility for handling negotiated costs in the same fashion as the other criteria.

THE ANALYTIC HIERARCHY PROCESS and Decision Support

According to Dr. Thomas L. Saaty, the "father" of AHP, humans have an innate ability to structure complex problems into constituent parts; these into their constituent parts, and so forth, hierarchically. In addition, we also naturally perceive the relationships between the key factors we've identified, compare pairs of similar factors, and make judgments about the intensity of our preference for one or the other of the pair. Finally, we "synthesize" all our judgments into a comprehensive perception of the overall system. (Saaty).

AHP allows a decision maker to visually portray a complex problem in the form of a hierarchy and to use either verbal or numerical judgments to compare criteria and alternatives in a pairwise fashion. Common sense tells us that every decision we make is based on some criteria and involves at least two choices. In fact, the great majority of decisions we make are simple and our decisions are intuitive--we rank the alternatives mentally and choose the one that satisfies the criteria we have established. But as the decisions become more complex, we have more difficulty handling all the competing criteria and alternatives mentally. As a result, we may make the "wrong" decision, which could lead to monetary, social, political, or personal loss. AHP can help us avoid these losses by helping us visualize competing alternatives and criteria.

Starting with an overall goal at the "top" of the hierarchy, AHP requires us to state the criteria upon which our decision will be based. These criteria form the next tier of the hierarchy. Under each criterion, there may be subcriteria, each of which may have subcriteria and so on. The alternatives being considered are at the "bottom" of the tree. To illustrate AHP, figure 1 below shows a hierarchy that depicts the alternatives and criteria involved in a decision on where to go camping.

CHOOSE BEST PLACE FOR CAMPING VACATION

COST   WEATHER   FACILITIES   ACTIVITIES

DEEP CREEK LAKE   CAPE COD   KITTY HAWK
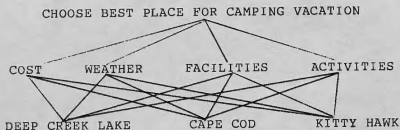
Figure 1

After the hierarchy is established and drawn, each of the alternatives is compared to the other alternatives with respect to each criterion. This "pairwise", or relative, comparison is intuitive to us as human beings. For example, when we consider where to take our camping vacation, we compare the alternatives to each other in terms of cost, weather, facilities, and activities, not to some abstract standard we have established. AHP merely helps us tackle complex issues in the same intuitive style we use on simpler problems. Using the judgments of the decision maker or experts supporting the decision maker, AHP uses mathematical algorithms to find the relationships that exist between the competing criteria and alternatives. It ranks the alternatives according to the judgments and values the decision maker has established.

Any mathematically based process requires time and energy to perform the calculations. The author's DSS eliminates the manual labor associated with AHP and makes structuring the hierarchy simple and quick. As stated in the Expert

Choice documentation, "An Expert Choice solution to a problem reflects the expertise of the decision maker, not the computer". (Expert Choice). The model presents screens structured according to the AHP methodology. After the decision maker identifies the criteria and alternatives in response to the DSS prompts, the system performs all the mathematical calculations required to produce a ranking of alternatives, based on the criteria and judgments entered.

After the process is complete, the decision maker can perform "what if" exercises to test the impact of changes in his or her judgment concerning the relative weights of the criteria or alternatives. A new alternative or additional criterion can quickly be assimilated into the model and their impacts determined literally at the touch of a button.

The best way to illustrate Expert Choice and AHP is by converting the TTVS acquisition to an analytic hierarchy and using Expert Choice to rank the contractor proposals.

SOURCE SELECTION WITH DECISION SUPPORT

The first task is to structure the criteria and alternatives into the AHP form. It is sometimes helpful to do so manually, to gain an overall perspective, shown in figure 2, below:
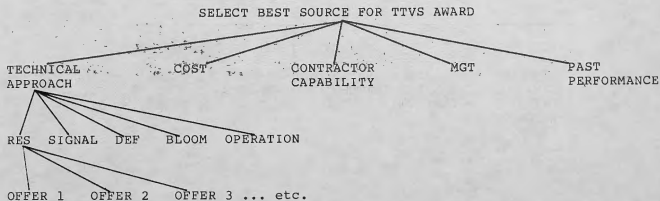
Figure 2

Only one group of relationships is drawn above due to the complexity, but the idea should be clear. Offer 1 is compared to the other offers with respect to Resolution. Each of the offers is also compared to one another with respect to Signal, Definition, Blooming, and Operation (see earlier discussion of subcriteria). The question is literally "Which offer is best, compared to the other offers?".

After the offers are compared with respect to every subcriterion in the hierarchy, each of the subcriteria is compared to the others with respect to its "parent" criterion. (For example, which technical subcriterion is most important with respect to Technical Approach?). Finally, each primary criterion is compared to the others with respect to the goal (Which is most important in deciding who will be selected for the contract award?). AHP, and the DSS in a user-friendly way, use all these judgments, assigned by the decision maker, to calculate an overall ranking of the alternatives.

The DSS does not do away with the customary requirement to perform a technical evaluation and thorough cost/price analysis of each proposal. What it does

is to help organize the process, convert subjective judgments to a form suitable for mathematical synthesis, perform the calculations, and, perhaps most importantly, provide a clear, logical, concise medium for communicating the recommended course of action to others.

Operation of the DSS is quite simple. The first thing it does is to ask the decision maker what his or her overall goal is. Then it asks for the criteria and subcriteria upon which the decision will be based. Finally, the alternatives being considered are added.

After this hierarchy is established, Expert Choice leads the user through a series of questions to determine the relative importance of the criteria and preference for the alternatives with respect to each subcriterion. This process forces the user to formally structure his thoughts, not only about the overall goal, but about every factor bearing on the decision. Figure 3 below shows the computer screen after the goal, the five criteria, and all subcriteria stated in the source selection plan have been input.

<pre>
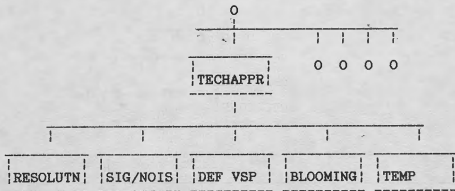   SELECT BEST SOURCE FOR CONTRACT AWARD
                          _____
                          | |
                          | GOAL |

                               |
   _____
   | | | | |
 --------   ---------   ----------   --------   ----------
 |TECHAPPR| |COST | |CAPABLTY| |MGT | |PASTPERF|
 --------   ---------   ----------   --------   ----------
 |-RESOLUTN |-REALISM |-EXPER'NC |-PGM MGT |-TECHNICL
 |-SIG/NOIS |-REASNBLE |-TECHNICL |-VENDORS |-COST
 |-DEF VSP |-COMPLETE |-SCHEDULE |-SCHEDULE
 |-BLOOMING
 |-TEMP
</pre>

Figure 3

Derivation of the precise numerical values shown in the boxes is done either by the model, based on the answers given to questions asked by the system, or by the decision maker himself, based on quantitative data such as cost figures.

Once the decision maker tells the DSS what the primary criteria are, the subcriteria are specified. Figure 4 shows the Expert Choice screen for the Technical Approach criterion. Notice how the system has drawn the hierarchy to show the goal "node" at the top (now unlabeled) and the Technical Approach node emphasized.

The subcriteria under Technical Approach are input by the decision maker, in this case the ones stated in the source selection plan: Resolution, signal to noise ratio, definition of VSP, blooming, and temperature considerations.

```
                               O
       _____ | _____
        :  |              . . |       |    |    |    |
                              |      O    O    O    O
                         | TECHAPPR |
                          ----------
                              |
     _____
      |            |           |            |          |
   _____  _____  _____  _____  _____
  |RESOLUTN |  |SIG/NOIS |  |DEF VSP  |  |BLOOMING |  |TEMP     |
   ----------   ----------   ----------   ----------   ----------
```

Figure 4

By simply moving the screen cursor to the next node representing the next
primary criterion and selecting the "Edit" option from the menu always dis-
played at the bottom of the screen, all the subcriteria can easily be added
under the appropriate node, as shown in figure 5, for the criterion "Cost" and
its three subcriteria: Realism, reasonableness, and completeness.

```
                               O
       _____ | _____
        |            . . .  . |       |    |    |
             O              |      O    O    O
                         |  COST    |
                          ----------
                              |
           _____
            |             |              |
        _____    _____    _____
       |REALISM  |    |REASNBLE |    |COMPLETE |
        ----------     ----------     ----------
```
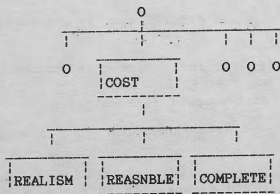
Figure 5

Once all the subcriteria are added, the actual alternatives being considered in
the decision are specified. In our case, the alternatives are the offers
submitted in response to the Request for Proposals. Using the Technical
Approach node once again and the Resolution subcriterion to illustrate, the six
offerors are listed, as shown in figure 6. (In an actual source selection, of
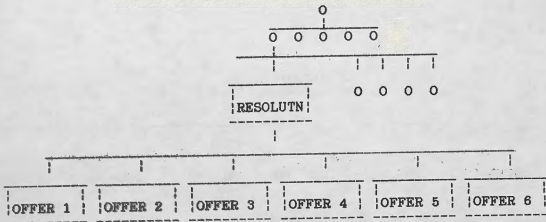course, company names would be used).

Figure 6

Once the complete hierarchy has been drawn, the process of determining the relative importance or preference of the alternatives, subcriteria and criteria begins. The DSS asks the decision maker to supply facts, if available, or to state his judgment concerning each of the comparisons in the hierarchy. We will use the Technical Approach criterion and Resolution subcriterion to illustrate. Notice that in figure 4, one of the menu selections at the bottom of the screen is "Compare". When this option is selected, Expert Choice asks the decision maker the following question:

With respect to Resolution

Are Offer 1 and Offer 2 equally preferable?

(Y/N)?

Let's assume the technical evaluation team chief answers NO, to which Expert Choice responds with another question:

With respect to Resolution

Is Offer 1 more PREFERABLE than Offer 2?

(Y/N)?

Based on an in-depth technical evaluation by Government experts, the team chief answers NO, because Offeror 2's proposal in this area was judged to be better. Expert Choice then displays the screen shown in figure 7, which compares Offer 2 to Offer 1 with respect to Resolution. Figure 7 shows a verbal scale with an arrow at the point that expresses the decision maker's judgment comparing Offer 2 to Offer 1. You can see that Offeror 2's proposal is considered equal to moderately more preferable than Offeror 1's with respect to Resolution, a technical approach criterion. The decision maker can change his assessment by moving the arrow with the cursor keys to another position on the scale. For instance, if the arrow is moved to the "strong" position, the language in figure 7 would change to "Offer 2 is strongly more preferable than Offer 1".

What is the basis for these judgments? Many technical evaluations result in a numerical rating for each offeror's proposal. Some use a more subjective approach. The point is that the DSS can handle either. If the verbal scale described above is used, the model will assign a numerical value to the judgment. If the decision maker prefers to specify judgments in numerical terms, the screen in figure 8 would be produced instead of the verbal scale shown in figure 7. In either case, after all judgments are made with respect to the resolution subcriterion, Expert Choice ranks the proposals based on all the judgments specified, converts the verbal judgments to numerical form and displays the results graphically, as shown in Figure 9. (Note that this ranking applies only to the technical subcriterion "Resolution").

For each pair of alternatives, the user is led through the same sequence of questions. The DSS then asks the decision maker to state the relative importance of each of the subcriteria with respect to each criterion. Finally, the model asks for comparison of each of the primary criteria with respect to the goal. These judgments are ordinarily included in the source selection plan.

GOAL: SELECT BEST SOURCE FOR CONTRACT AWARD

With respect to
RESOLUTN < TECHAPPR < GOAL

OFFER 2 :
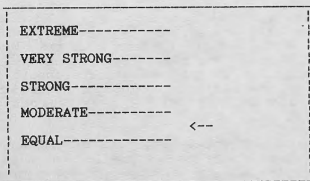 is EQUAL to MODERATELY MORE PREFERABLE THAN
OFFER 1 :

```
 _____
|                                        |
|  EXTREME-----------                     |
|                                        |
|  VERY STRONG-------                     |
|                                        |
|  STRONG------------                     |
|                                        |
|  MODERATE----------                     |
|                              <--        |
|  EQUAL-------------                     |
|                                        |
|_____|
```

Figure 7

JUDGMENTS WITH RESPECT TO
RESOLUTN < TECHAPPR < GOAL

	OFFER 1	OFFER 2	OFFER 3	OFFER 4	OFFER 5	OFFER 6
OFFER 1		2.0	(3.0)	3.0	2.0	2.0
OFFER 2			(2.0)	4.0	3.0	2.0
OFFER 3				6.0	5.0	4.0
OFFER 4					(2.0)	(3.0)
OFFER 5						(2.0)
OFFER 6						

Matrix entry indicates that ROW element is ___
  1 EQUALLY   3 MODERATELY   5 STRONGLY   7 VERY STRONGLY   9 EXTREMELY
more PREFERABLE than COLUMN element unless enclosed in parenthesis

Figure 8

SYNTHESIS OF LEAF NODES WITH RESPECT TO RESOLUTN

OFFER 3   0.393 ██
OFFER 2   0.223 ███████████████████████
OFFER 1   0.149 ███████████████
OFFER 6   0.113 ███████████
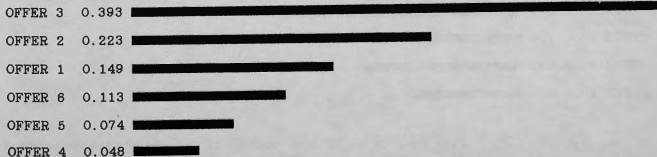OFFER 5   0.074 ███████
OFFER 4   0.048 █████

Figure 9

Can we be sure that the verbal mode of comparison used by Expert Choice is valid? Words are, in general, an imprecise way to express complex concepts. (Any parent who has had difficulty communicating with a teenage child can attest to the multiple meanings that can be attached to most words). How, then, can the author claim accuracy when using words to express complex relationships? The answer goes to the heart of AHP itself. In Expert Choice, all judgments are "pairwise"; that is, between two related factors (criteria, subcriteria, or alternatives). Since there are many of these pairwise judgments, the results of all the verbal judgments, taken together, tend to "average out" the normal inconsistencies associated with verbal language. (See The Analytic Hierarchy Process by Thomas L. Saaty) (Saaty, 1980).

Concerning the validity of this approach, Dr. Ernest Forman, in his paper "Executive Decision Support", states, "To be credible, this new approach (the natural pairwise ratio scale and the mathematical technique used to "average" judgments) should work in areas where we already know the unit of measurement. In fact, it has been validated in hundreds of experiments that the method does indeed generate results conforming to classic ratio scale measurement in physics, economics, and other fields where standard measures already exist."(Forman).

Returning to our source selection, as the SSEB progresses through its technical, cost, and other evaluations of the proposals, the results are entered into Expert Choice. Part of the source selection process includes the issuing of notices to the offerors asking for clarification and correction of minor deficiencies. As information is received from the offerors or information is gained during negotiations that clarify points in the proposals, members of the source selection organization can update the Expert Choice model to reflect the new information, especially if it affects the relative merit of an offer.

Once all the proposals are evaluated with respect to each of the criteria, the program "synthesizes" the entire hierarchy to produce a list and bar chart showing the ranking of the alternatives.

Figure 10 shows the overall results of our source selection.

SELECT BEST SOURCE FOR CONTRACT AWARD

SYNTHESIS OF LEAF NODES WITH RESPECT TO   GOAL

OVERALL INCONSISTENCY INDEX = 0.03

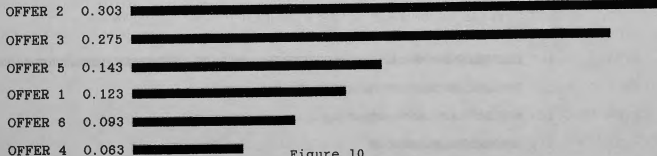|		
OFFER 2	0.303	██████████████████████████
OFFER 3	0.275	████████████████████████
OFFER 5	0.143	█████████████
OFFER 1	0.123	███████████
OFFER 6	0.093	████████
OFFER 4	0.063	█████

Figure 10

In our hypothetical example, Offer 2 was judged to be the "best" source to receive a contract award. How can the SSEB communicate this, along with its rationale, to the SSAC, and the SSAC in turn to the Source Selection Authority? By merely pressing the "control" button on the keyboard and the letter "i"

simultaneously, information supporting the judgment highlighted when the keys are pressed is displayed on the screen. (The information itself is input by the user of the system as he or she deems appropriate to support key aspects of the decision.). For example, starting with the goal node, the SSA might like some information on the relative importance of the criteria that the decision will be based on. Figure 11 shows the screen produced when "control i" is pressed. Any comment, including numerical entries, can be included, regardless of the number of lines of text.

AWARD WILL BE BASED ON THE FOLLOWING FIVE CRITERIA:

(Relative importance determined by SSA and SSAC)

-- Technical Approach (.323)--Proposals were evaluated for thoroughness and practicability of design concept.

-- Contractor Capability (.245)--Experience, expertise of management and engineering team, plans to meet critical milestones.

-- Past Performance (.185)--Technical, cost and schedule performance on previous Government contracts.

-- Cost (.141)--Cost reasonableness, realism, and completeness of cost and price proposals were evaluated.

-- Management (.107)--An evaluation was made of each offeror's approach to overall program management, and subcontractor/vendor management.

Figure 11

Now assume the SSA wants more information on the Technical Approach issue, Resolution. The information shown in figure 12 was added earlier by a technical evaluation team member and produced here by pressing Ctrl "i". The best proposal was by Offeror 3, as explained below:

RESOLUTION--A TECHNICAL APPROACH SUBCRITERION
==

RESOLUTION: The Government technical evaluation team analyzed each offeror's technical proposal. The evaluation included fact-finding visits to each offeror's facilities and discussions to clarify hazy points in each proposal.

Deficiency reports were provided to each offeror as necessary. Based on the technical evaluation concerning Resolution, Offer 3 was judged most preferable.

Figure 12

The model is also capable of displaying numerical data on these information screens. Figure 13 shows an abbreviated cost comparison worksheet produced in response to a "control i" request under the Cost node of the hierarchy. In this case, the user decided to merely summarize the offers and defer specific information supporting the judgments to subordinate nodes. (This spreadsheet was produced using Lotus 1-2-3, which is fully compatible with Expert Choice, as are most other popular spreadsheets).

ABBREVIATED COST COMPARISON WORKSHEET (THOUSANDS OF DOLLARS)

	OFFER 1	OFFER 2	OFFER 3	OFFER 4	OFFER 5	OFFER 6	GOV'T EST
Mater'ls	$4,552	$4,598	$3,656	$3,947	$2,087	$2,800	$2,565
Engrng	$75	$136	$99	$353	$66	$350	$333
Mnfctng	$28,860	$27,334	$21,000	$25,390	$30,188	$25,487	$29,033
Svcs	$40	$56	$55	$102	$64	$28	$55
Other	$37	$25	$40	$37	$24	$50	$40
G&A	$3,021	$2,894	$2,982	$3,580	$6,486	$4,307	$3,843
TotCost	$36,585	$35,043	$27,832	$33,409	$38,915	$33,022	$35,869
Profit	$5,488	$5,256	$4,175	$5,011	$5,837	$4,953	$4,304
TotPrice	$42,073	$40,299	$32,007	$38,420	$44,752	$37,975	$40,173
Realism*	($1,900)	($126)	$8,166	$1,753	($4,579)	$2,198	N/A

*The difference between the Gov't estimate and contractor proposal

Figure 13

Figures 14 and 15 show more detailed information for Cost Realism and Price
Reasonableness (again produced with the model's information feature). Who was
rated "best" in each case and why? In a similar manner, each of the nodes of
the hierarchy can be supported by information in sufficient detail to provide
an excellent briefing tool to the SSA and other senior managers. This in-
formation would also prove very valuable as part of the permanent record of the
source selection proceedings.

COST REALISM--A COST SUBCRITERION
==

OFFER 2 WAS JUDGED TO BE MOST PREFERABLE

Cost Realism is simply the difference between the contractor's proposal
and the Government estimate, which is based on a number of cost estimating
relationships, including historical costs associated with similar contracts.

Figure 14

COST REASONABLENESS--A COST SUBCRITERION
==

OFFER 5 WAS THE MOST PREFERABLE PROPOSAL

This judgment was based on Offer 5's price, which was $4,579,610 below
the Government estimate, and favorable in comparison to the other proposals.

Since the contract will be firm fixed price, the Government bears no risk of
subsequent cost growth.

Figure 15

The capability of this DSS to synthesize judgments and empirical facts to
produce a valid ranking of alternatives should now be apparent. Notice from

figure 10 that Offeror 2 was ranked first by the model, based on the judgments and facts input by the Government's evaluators. From figure 3 it can be seen that technical approach (TECHAPPR) was considered the most important criterion in this decision. Despite the fact that Offeror 2 did not have the best overall technical proposal, the strength of Offer 2 in other areas overcame the deficit. By encouraging the decision maker to structure his thoughts and make judgments about each of the alternatives and criterion that affect the decision to be made, the DSS produce a synthesized "final recommendation" that was based wholly on the factors and judgments entered by the decision maker and staff.

SUMMARY

In today's environment of increasing regulation and the resultant complexity of the Government acquisition process, automated decision support aids will become indispensable. One such tool, the Analytic Hierarchy Process, has been used successfully in a variety of complex decision situations by both industry and Government officials. This paper has illustrated its use, in the form of a DSS model developed by the author using Expert Choice software, in a simulated source selection.

AHP and this model offer advantages over traditional approaches of color coding and simple weighting and scoring methods. The capability to make pairwise comparisons with Expert Choice and the ease with which the program makes the mathematical calculations necessary to synthesize the judgments into a final "ranking" are major advantages this decision support system has over manual source selection methods. The system's ability to handle subjective, as well as objective, criteria also place it above other methods in flexibility and comprehensiveness. Finally, the model's usefulness in communicating the results of the decision process to others, in this case the Source Selection Authority, make it an invaluable tool for complex decision situations involving many players, operating under public scrutiny.

CONCLUSION

Most practitioners who have participated in a major source selection would agree that the process currently in use needs to be streamlined and automated. Already electronic spreadsheets and automated document preparation programs have begun to be widely used. While these innovations have increased the productivity of clerical people and cost analysts, they do not directly help managers make better, more timely decisions. Models based on the Analytic Hierarchy Process, such as the DSS presented here, can be applied with immediate results to virtually any complex decision situation. As a general rule, Expert Choice and other microcomputer-based decision support software is relatively inexpensive, requires little training to become proficient, and is available now.

NOTES

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