EXPERT CHOICE TUTORIAL

This tutorial will guide you through two practice problems.

1) You will build, make assessments in, synthesize, and perform sensitivity on an EC model to find the best place to go on vacation.
2) You will create another type of model to rate vacation cities against standards you will establish.

EXERCISE 1 - CHOOSING A VACATION SPOT

In this exercise you will build a model and perform pairwise assessments throughout. You will then synthesize to get your results and perform sensitivity analyses.

Your goal will be to find the best vacation place. We suggest you limit the number of criteria to four, and the places to three or four. You might choose from criteria such as cost, night life, friends, shopping, ocean, scuba diving, hiking, golfing, ease of getting to, climate, attractions, etc.

START A NEW MODEL

To start a new model, do the following:

1. Click on the EXPERT CHOICE icon on the desktop, or select Start, Programs, Expert Choice 2000 and select the Expert Choice 2000 icon.
2. Select File then New from the menu. Enter a name for your model (for example, Vacation).
3. Enter a brief description such as SELECT BEST PLACE TO GO ON VACATION.

ENTER YOUR OWN CRITERIA AND VACATION PLACES

Enter the Criteria

1. Select Edit then Insert Child of Current Node from the menu type your first criterion and press the <Enter> key. Continue entering criteria
2. Press <Esc> to stop the process of inserting criteria.

Enter the Alternatives

1. Next you will enter the alternatives, the cities, by selecting Edit Alternative Insert, or by clicking the “Add Alternative” Icon at the top right of the Alternatives panel.
The model is now complete. An example is shown in Figure 1. The goal and criteria are in the treeview panel at the left. The alternatives are in the Alternative Panel at the right. You could also insert subcriteria and sub-subcriteria in the treeview panel as well, but we asked you to keep it simple this time.

**MAKING ASSESSMENTS (ENTERING YOUR JUDGMENTS)**
Move to the goal node to make assessments (i.e. enter your judgments) on the criteria.

First enter judgments for the importance of the criteria with respect to the goal, then the alternatives with respect to each criterion. Use these steps:

1) Move to the Goal Node and click on it.
2) Select Assessment then Pairwise from the menu, then select:

The verbal assessment screen for the criteria is shown in Figure 2. To move back to the main screen at any time click the blocks icon for the treeview of the model.
Figure 2. The Verbal Assessment Screen where you will make Judgments.

- Click with the mouse to move the indicator up and down the scale. Move it up if Activities are more important to you and move it down if Nitelife is more important to you.
- When you are finished with a judgment, move to the next cell by clicking in it with the mouse.

Figure 3. The Verbal Comparison Screen as it appears when Judgment 3 is the Current Judgment.
Figure 3 shows three of the six judgments entered. When the number is in red, it indicates the criterion at the top is more important than the criterion at the left. When it is in black, the one at the left is more important than the one at the right. So, here we have:

- **Activities** are between moderately and strongly more important than **nitelife**.
- **Sights** are between moderately and strongly more important than **Activities**
- **Cost** is between equally and moderately more important than **Activities**.

When you finish the comparisons by filling in all the white cells, click on the Calculate icon to find the priorities of the criteria with respect to the goal. If you accidentally end up back on the main screen, click on the tab to return to the Verbal assessment screen and click Calculate.

**IMPROVING INCONSISTENCY**

The Inconsistency ratio, shown at the bottom of the priorities screen is 0.1. It should be about 0.1 or less. It is okay here, but we will show you how to improve it in any case.

- Return to the pairwise comparison screen by clicking the ABC icon.
- Select Inconsistency, 1st from the menu to reveal the most inconsistent judgment.
The judgment in red, 4.0, for Activities at the left versus Sights at the top will be highlighted as the 1st most inconsistent judgment. A red judgment is an “inverted” judgment because the element at the top, Sights, is more important than the element at the left.

- Select the Inconsistency command and Best Fit on its dropdown menu to have the best judgment of “inverted 1.1” displayed. This means keep the judgment in red (i.e. Sights is more important) and replace the 4.0 with 1.1. To “invert” or “uninvert” a judgment, use the indicator on the scale, or click the invert icon.

This process will reduce the inconsistency to .02.

**COMPARE THE CITIES UNDER EACH CRITERION**
Move to each criterion in turn by clicking on it and compare the cities using the Assessment command as you did the criteria. Note that this time the cities are compared using the word “preference”. Which city do you “prefer” for activities? And so on.

**SYNTHESIZING TO GET RESULTS**
After all your judgments have been entered, return to the main treeview of the model, and select the Synthesize, from Main Goal command. The results of the model are shown in Figure 4.
SENSITIVITY ANALYSIS
Do sensitivity analysis with the Sensitivity-Graphs command. In doing sensitivity analysis one varies the priorities of the criteria to observe the effect on the priorities of the alternatives. Experiment with changing the priorities of your criteria (by clicking and dragging the criterion bars). All five types of sensitivity available in Expert Choice are shown in the next page in Performance, Gradient, Dynamic, 2-D Plot and Differences. You can open four types of sensitivity at once.

- Select Sensitivity-Graphs then Dynamic Sensitivity from the menu, and drag the bars for the criteria back and forth to see the effect of changing their priorities.
- Select Sensitivity All Four from the Window menu to see the all the graphs displayed at once.

Figure 5. Dynamic Sensitivity Graphs showing New York is Best.
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4) You will create another type of model to **rate** vacation cities against standards you will establish.
EXERCISE 2 - CONVERT THE PREVIOUS MODEL INTO A RATINGS MODEL

In this exercise you will convert a Vacation model into a ratings model by replacing the alternatives with rating intensities, which will serve as standards. The alternatives are entered into in a ratings spreadsheet where they are rated against the standards established in the main model. The Process of rating alternatives against standards is referred to as performing absolute measurement.

We shall show the process using the model in the following figure.

1. Start with your model from Exercise 1.
2. Make a copy of it by selecting File, Save as, then enter a new name such as VACATN2. This process leaves you in a copy of the model.
3. Click on the Data Grid icon to get into the Ratings spreadsheet.
4. Click on the first cell in the spreadsheet. Then select Formula Type from the menu and Ratings as shown below.
ESTABLISH RATING INTENSITIES FOR EACH COLUMN (AND PRIORITIZE)

When you wish to use the same scale for more than one column go to the Formulas Grid by clicking on the icon. All the formulas for the criteria are displayed here (after you have selected or created them). We used a ratings formula for the three criteria below.

1. THE SAME RATINGS SCALE IS USED FOR 3 CRITERIA: COST, CULTURE, FOOD

<table>
<thead>
<tr>
<th></th>
<th>Excellent</th>
<th>Above Avg</th>
<th>Average</th>
<th>Below Avg</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1 (.000)</td>
<td>2 (.538)</td>
<td>3 (.189)</td>
<td>4 (.089)</td>
</tr>
</tbody>
</table>

2. A STEP SCALE IS USED FOR THE COST CRITERION

<table>
<thead>
<tr>
<th></th>
<th>Cheap</th>
<th>Moderate</th>
<th>Above Avg</th>
<th>Med High</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value</td>
<td>1 (.206)</td>
<td>2 (.000)</td>
<td>3 (.889)</td>
<td>4 (.381)</td>
<td>5 (.095)</td>
</tr>
<tr>
<td>Range</td>
<td>0</td>
<td>1200</td>
<td>2500</td>
<td>4000</td>
<td>5000</td>
</tr>
</tbody>
</table>

In this scale data is used about the cost. The first step is $0 up to $1200 (cheap), the second step is $1200 up to $2500 (moderate), the third step is $2500 up to $4000 (Above Avg), the fourth step is $4000 up to $5000 (Med High), and the fifth step is above $5000 (High). Select the Step type of formula to input data in ranges in this way. Enter the actual data value in the cell when doing the assessments.

3. A DIFFERENT RATINGS SCALE IS USED FOR THE WEATHER CRITERION

<table>
<thead>
<tr>
<th></th>
<th>Moderate</th>
<th>Warm</th>
<th>Cool &amp; Cloud</th>
<th>Hot</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value</td>
<td>1 (.000)</td>
<td>2 (.450)</td>
<td>3 (.180)</td>
<td>4 (.100)</td>
</tr>
</tbody>
</table>

Note that the extremes of cool and cloudy and hot have the lowest values.

4. ANOTHER RATINGS SCALE IS USED FOR TRAVEL TIME

<table>
<thead>
<tr>
<th></th>
<th>less than six</th>
<th>six to &lt; 12</th>
<th>twelve to &lt;</th>
<th>eighteen to</th>
<th>twentyfour h</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value</td>
<td>1 (.000)</td>
<td>2 (.475)</td>
<td>3 (.209)</td>
<td>4 (.074)</td>
<td>5 (.058)</td>
</tr>
</tbody>
</table>

The ratings above are in terms of travel time:
   a) less than six hours
   b) from six up to 12 hours
   c) from 12 up to 18 hours
   d) from 18 up to 24 hours
e) more than 24 hours

RATE THE VACATION PLACES ON EACH CRITERION

Rate the cities under each criterion by selecting the appropriate rating in each cell.
- First click on the cell, then click on the desired rating at the top of the screen, or else type the number of the rating.

The Ratings Spreadsheet for the Places after making Assessments

To show the final results, select View, Totals to show the Total column and the final results.

In this example, the final results show that Egypt is the best vacation place because it has the highest total (performance evaluation or measure).

The scores are in essence “performance measures” for the places. A perfect vacation spot, one that was rated in the top category on every criterion, would get a score of 1.000. Thus Egypt is 92.1% as good as the perfect city. The scores are ratio scale numbers, so, for example, a total of 0.80 would be twice as good as a total of 0.40. Such measures can be used to allocate resources.

You can order the cities from best to worst. Click on the Edit command and select Sort, Descending order to arrange the alternatives from highest to lowest.

PERFORMING SENSITIVITY FROM RATINGS MODELS
To perform sensitivity from a ratings model you must extract the top alternatives into a relative model. Right click with the mouse on each alternative to be extracted as an alternative to the main model. Then return to the main model view by clicking on the icon . You will then perform sensitivity in the usual with the command Sensitivity-Graphs, Dynamic to see the sensitivity shown in the figure below.

Return to the Main Model and Select Sensitivity-Graphs to Perform Dynamic Sensitivity.