BASIC CONSIDERATIONS

In making pairwise comparisons, various shortcuts could be employed. First, three broad categories of probabilities could be highlighted:

- Very unlikely events at say around 1% probability.
- Moderately likely events at say 15% - 20% probability.
- Very likely events at say 40% - 60% probability.

Corresponding "more likely" ranges here would be respectively: Base, 15%/1% or say 14 to 16, and 60%/15% or say 3 to 4 times "more likely".

Using a four event problem as an example, let the events in order of likelihood be A (lowest probability), B. C and D (highest probability). Probabilities are outlined in the following table.

CALCULATION OF PROBABILITIES

Scenarios		Pairwise Range		Probabilities				More Likely Values	
Events	Ratios	Low	High	Low End	High End	Average	%	Average	%
A	Base = 1	1.00	1.00	0.005	0.003	0.004	1	Base	Base
B	B/A	14.00	16.00	0.076	0.047	0.062	6	15.50	6.00
C	C/B	3.00	4.00	0.230	0.190	0.210	21	3.39	3.50
D	D/C	3.00	4.00	0.689	0.760	0.724	72	3.45	3.43
				1.000	**1.000**	**1.000**	**100**		

The decision-maker (DM) here could decide that the increase in likelihood for D over C is about the same as for C over B or 3 – 4 times "more likely" as above. That is, *gains in likelihood* may be assessed *relatively* as the DM proceeds through the ranking of events. Equal likelihood requires 1 – 1 for the current event over its predecessor in the ranking of events. In practice for percentage probabilities, anything in the zero to 1% range is recorded as 1% as above.

Sensitivities to pairwise ranges for resulting probabilities are outlined in the following table.

PROBABILITIES FOR VARIOUS D/C "MORE LIKELY" PAIRWISE RANGES

Scenarios		Probabilities by Pairwise Range for D/C				More Likely Values by D/C Range			
Events	Ratios	2 - 3	3 - 4	3.5 - 4.5	4 - 5	2 - 3	3 - 4	3.5 - 4.5	4 - 5
A	Base	0.005	0.004	0.004	0.003	Base	Base	Base	Base
B	B/A	0.079	0.062	0.056	0.051	15.80	15.50	14.00	17.00
C	C/B	0.266	0.210	0.190	0.173	3.37	3.39	3.39	3.39
D	D/C	0.650	0.724	0.750	0.772	2.44	3.45	3.95	4.46
		1.000	**1.000**	**1.000**	**0.999**				

When assessing the D/C pairwise range, the DM could judge that it is the same as the C/B judgment or a 3 – 4 times "more likely" gain. Slightly less likely could mean a 2 – 3 range and 4 – 5 for a slightly greater likelihood gain. The ease of spreadsheet calculation makes deriving resulting probabilities routine. And subsequent alterations to the distribution may be easier to make with an axiomatically correct distribution already available. That is, increasing the probability of one event necessarily requires another event to have a lower probability than currently calculated. When assessing these changes, the DM is essentially comparing the two events affected (not necessarily adjacent events) with their current probabilities in the background.

CONCLUSIONS

Two strategies can be employed:

- Direct event-by-event comparisons with encompassing range as in 60%/15% above or say 3.5 – 4.5.
- Range comparisons by likelihood gain with a first range of 3 - 4 , less gain 2 - 3 and more gain 4 – 5 etc.