

Adjusting Probabilities After a New Consensus

If new information arises that necessitates a new consensus (new initial POA values), it does not make sense to zero any overall cumulative POS (OPOScum) since (1) intuitively it follows that cumulative POD in each segment (SPODCum) should stay the same (it is not dependent on POA at all), and (2) OPOScum would typically decrease depending on how and where the original search resources were allocated prior to the new consensus, but it should not return to zero since some searching had been done.

Here's an example of how it works (see Equations at right):

1. Segment 'A' is initially assessed a POA of 0.8 and segment 'B' a POA of 0.2 (see Example at right).
2. After several searches, their POAs are reduced to 0.1 each. This makes the SPOScum for segment 'A' 0.7 and the SPOScum for segment 'B' 0.1 for a total OPOScum to date of 0.8 or 80%.
3. Now, new evidence comes to light and the initial POAs are revised via new consensus to give segment 'A' an initial POA of 0.3 and segment 'B' an initial POA of 0.7.
4. Using Equation 1, calculate the new SPOScum using the new segment POA (SPOA_{0,2}) established from the latest consensus.
5. Using Equation 2, calculate the new adjusted POA (SPOAadj) by subtracting the segment cumulative POS (SPOScum) from the new segment POA (SPOA_{0,2}) determined from step 4 above.

[Equation 1] $SPOS_{CUM} = SPOA_{0,n} \times SPOD_{CUM} = SPOA_{0,n} - SPOA_{adj}$

[Equation 2] $SPOA_{adj} = SPOA_{0,n} - SPOS_{CUM}$

Where:

- SPOS_{CUM} is the cumulative probability of success of the segment
- SPOA_{0,n} is the initial POA assigned to the segment after the nth consensus.
- SPOD_{CUM} is the cumulative probability of detection of the segment
- SPOA_{adj} is the current adjusted POA of the segment

$$SPOD_{CUM} = \frac{SPOS_{CUM}}{SPOA_{0,n}} = \frac{SPOA_{0,n} - SPOA_{adj}}{SPOA_{0,n}} = 1.0 - \left[\frac{SPOA_{adj}}{SPOA_{0,n}} \right]$$

Equations - Calculating SPOScum, SPODCum and SPOAadj can be performed in a number of ways depending on which variables are defined. The bottom equations show how SPODCum can be back calculated.

Before New Consensus (OPOScum = 0.8)	
Segment A	Segment B
SPOA _{0,1} = 0.800	SPOA _{0,1} = 0.200
SPOD _{CUM} = 0.875	SPOD _{CUM} = 0.500
SPOS _{CUM} = 0.700	SPOS _{CUM} = 0.100
SPOA _{adj} = 0.100	SPOA _{adj} = 0.100
After New Consensus (OPOScum = 0.6125)	
Segment A	Segment B
SPOA _{0,2} = 0.300	SPOA _{0,2} = 0.700
SPOD _{CUM} = 0.875	SPOD _{CUM} = 0.500
SPOS _{CUM} = 0.2625	SPOS _{CUM} = 0.350
SPOA _{adj} = 0.0375	SPOA _{adj} = 0.350

Example - Adjusting POScum after a new consensus.

As expected, the overall probability of success decreased when lower POA values were assigned to some of the searched segments in the new consensus.