



# Advanced Excel

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# Efficient Model Building

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- **Use well-identified blocks**
- **Group into separate blocks:**
  - assumptions
  - intermediate calculations
  - results
- **Build the model in order to optimize:**
  - screen work
  - printing

# Searching...



# The Lookup() Function

A series of nested IF() functions may be used in B21 in order to get the postal rate, however the proper formula is:

`=lookup(B20, A5:B18)`

	A	B
4	Weight	Letter
5	0 oz	0,39 \$
6	1 oz	0,63 \$
7	2 oz	0,87 \$
8	3 oz	1,11 \$
15	10 oz	2,79 \$
16	11 oz	3,03 \$
17	12 oz	3,27 \$
18	13 oz	Priority mail
19		
20	Weight	11,22 oz
21	Letter	3,03 €

# The Lookup() Algorithm

- Go down the first column until you find a value  $>$  the value you are looking for
- Go up one row and return the rightmost value in this row
- This implies that the first column has its values in an ascending order
- « Horizontal » table  $\rightarrow$  switch rows/cols

# Two Possible Syntaxes

- **=lookup(value,matrix)**  
in order to look up for a value in a vertical or horizontal matrix
- **=lookup(value,vector 1,vector 2)**  
looks up for the value in vector 1 and returns what is exactly in the same position in vector 2 (vectors have same dimension)

# The xLookup() Functions

- **Syntax of V Lookup:**  
**=vlookup(value,matrix,col #,false)**
  - Same syntax for hlookup with row #
  - **true** or nothing = intermediate values are OK
- **Using xLookup() with the Row() or Column() functions, you recover many different results using the same formula**

# The Index() Function

- **First syntax:**  
=index(vector,position)
- **Second syntax:**  
=index(matrix,row #,col #)
- **Third syntax:**  
=index({matrices}, row #,col #,mat #)

# The Match() Function

- **Syntax: =match(value,vector,0)**
  - finds the position of the 1<sup>st</sup> occurrence
  - the vector does not need to be sorted
- **Other possible third arguments**
  - 1 (default value), position of the last value less than or equal to **value** (like Lookup)
  - -1 : position of the last value  $\geq$  **value**
  - with +1 or -1, the vector is usually sorted

# Using The Match() Function

- Find the position of a maximum:  
`=match(max(vector);vector;0)`
- Identify the last used row in a column:  
`=match(-10^9;C:C;-1)`
- Many possible applications in conjunction with the Offset() or Index() functions



# Time-Dependent Models

- A natural set-up is to have the different times in columns
- But 256 columns mean that a 1-minute simulation is limited to 2 hours
- A solution is to parameter the time period so that you may, with the same model, run 4 hours with a 2-minute time interval

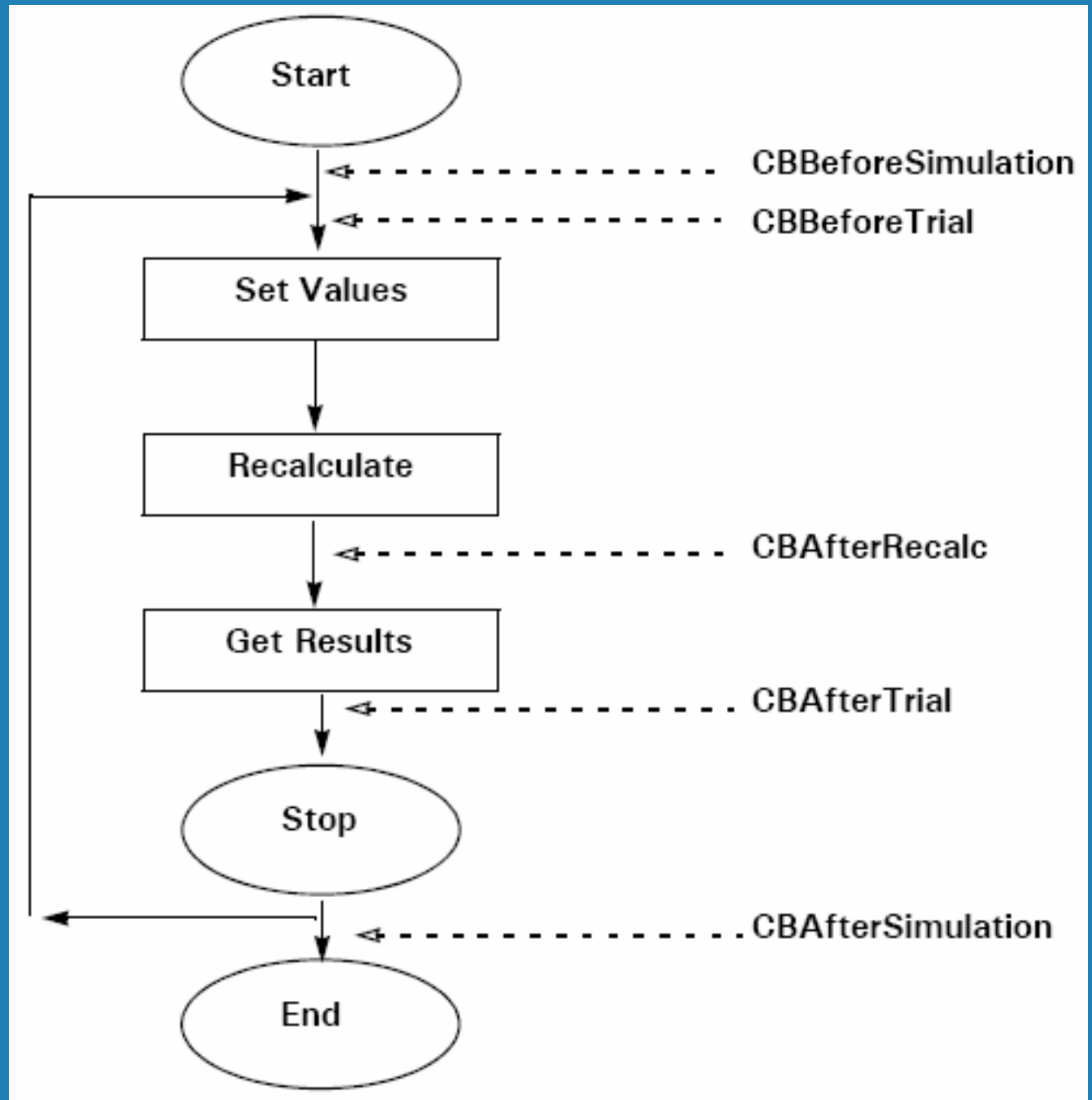
# Calling CB 7.2 from VBA...

- In the VBA editor, the Tools – References command must refer to the CBDevKit
- The VBA commands may reset, define the assumptions, run the simulation,...
- There are some incompatibilities between the CB 5 version and the CB 7 version

# Calling VBA from CB 7.2 ...

- There are five reserved macro names, one for each step (see next slide)
- Novelty: there is a CBAfterRecalc macro **and** a CBAfterTrial macro
- You may deactivate all these macros in one shot with a single test on a public flag

# How you may use VBA with Crystal Ball 7.2





# Step By Step Model Creation

- Create the graph with the background and three series of points
- Put a scroll bar for the selection of the time to be represented
- Create a macro for continuous animation
- We would also need a macro generating the simulation data...

# Calling VBA from CB 7.2 ...

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- Novelty: there is a CBAfterRecalc macro **and** a CBAfterTrial macro
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# Conclusion

- **With a good mastery of Excel and Crystal Ball, there are few limits to achievements**
- **Whenever I compete in tender offers, my Excel & Crystal Ball solution is at least 3 times cheaper than the second best offer**
- **References:**
  - [thiriez@hec.fr](mailto:thiriez@hec.fr)
  - <http://monsieur-excel.blogspot.com/>