

## **2 Workbook Review - Formulae Analysis**

There are four output options available when the Formulae Analysis tool has been selected:

1. Unique formula summary;
2. Unique formula listing;
3. Maps; and
4. Colour unique formulae and inputs.

These all perform a very similar analysis of the worksheets, but present the results in different ways. They can be run to analyse an entire workbook or a single sheet within a workbook as required. The default is to analyse the entire workbook.

### **2.1 Unique Formula Summary**

The Unique Formula Summary feature provides a basis for estimating the time for reviewing a model. It is based on a default average of 2 minutes per unique formula, but this amount may be adjusted based on the skill of the reviewer and the complexity of the model. This default should be adjusted to reflect the complexity and specifics of the model and the project (see also Formula Score below). In addition, when estimating the total time, account must be taken of efficiency techniques, such as when the model contains structural repetition that can be reviewed without checking every single unique formula. The Result sheet contains an input for the reviewer's initials for engagement planning purposes. The actual minutes can be added as the review progresses to measure actual minutes per formula against the budgeted minutes per formula.

## **2 Workbook Review - Formulae Analysis**

There are four output options available when the Formulae Analysis tool has been selected:

1. Unique formula summary;
2. Unique formula listing;
3. Maps; and
4. Colour unique formulae and inputs.

These all perform a very similar analysis of the worksheets, but present the results in different ways. They can be run to analyse an entire workbook or a single sheet within a workbook as required. The default is to analyse the entire workbook.

### **2.1 Unique Formula Summary**

The Unique Formula Summary feature provides a basis for estimating the time for reviewing a model. It is based on a default average of 2 minutes per unique formula, but this amount may be adjusted based on the skill of the reviewer and the complexity of the model. This default should be adjusted to reflect the complexity and specifics of the model and the project (see also Formula Score below). In addition, when estimating the total time, account must be taken of efficiency techniques, such as when the model contains structural repetition that can be reviewed without checking every single unique formula. The Result sheet contains an input for the reviewer's initials for engagement planning purposes. The actual minutes can be added as the review progresses to measure actual minutes per formula against the budgeted minutes per formula.

## **2.2 Unique Formula Listing**

The Unique Formula Listing ("UFL") shows all unique formulae contained in a model, and includes a Formula Score ("F-Score") column that provides an indication of the complexity of each formula. A higher F-score indicates that it may take longer to review. The unique formulae are pre-numbered to ensure that each unique formula is allocated a unique reference number (Unique Formula Indicator or "UFI"). The Finding Index Number ("FIN") is a sequential number automatically inserted by the Client Report Tool and is used to allocate a unique reference number for findings sent to the client.

There are two running totals at the top of the UFL. The first shows the number of unique formulae in the list and the second shows the number of unique formulae that have been reviewed, based on the non-blank cells in the status column. If AutoFilter is used, these running totals will show the corresponding results for the specified filtered list.

A further benefit to the reviewer is that the UFL includes a Pivot Table report which automatically monitors the progress of a model review.

The UFL has been designed to be able to be sent to a client for response if required. Consequently, columns such as "Status", "Priority", "Comment" and "Client Response" are typically informative fields that allow the client and reviewer to communicate with each other and for the client to establish how seriously any errors in the model are rated by the reviewer. The client in turn can respond to particular issues that the reviewer has raised by including his responses in the "Client Response" field.

Array Formulae Analysis is performed with Unique Formulae Analysis. Array formulae are reported by the array area they occupy. Each new array area is reported as a unique formulae in the Unique Formula Listing, and can be identified from the following aspects: 1) UFIs are prefixed with an "A"; 2) formulae are surrounded by curly brackets ("{}"); and 3) Array Range column is populated with the relevant array areas. Note that for data tables, the array range includes one row above and one column to the left of the formula range. E.g. if the {TABLE(...)} formulae are in range \$C\$3:\$D\$10, the array range will be \$B\$2:\$D\$10.

Array formulae add a much higher degree of complexity to a model review, as they are more difficult to interpret than ordinary formulae. If array formulae are identified within a model being reviewed, the reviewer should ensure that the review of the array formulae sections is conducted by individual(s) with experience and understanding of how array formulae operate.

## **2.2 Unique Formula Listing**

The Unique Formula Listing ("UFL") shows all unique formulae contained in a model, and includes a Formula Score ("F-Score") column that provides an indication of the complexity of each formula. A higher F-score indicates that it may take longer to review. The unique formulae are pre-numbered to ensure that each unique formula is allocated a unique reference number (Unique Formula Indicator or "UFI"). The Finding Index Number ("FIN") is a sequential number automatically inserted by the Client Report Tool and is used to allocate a unique reference number for findings sent to the client.

There are two running totals at the top of the UFL. The first shows the number of unique formulae in the list and the second shows the number of unique formulae that have been reviewed, based on the non-blank cells in the status column. If AutoFilter is used, these running totals will show the corresponding results for the specified filtered list.

A further benefit to the reviewer is that the UFL includes a Pivot Table report which automatically monitors the progress of a model review.

The UFL has been designed to be able to be sent to a client for response if required. Consequently, columns such as "Status", "Priority", "Comment" and "Client Response" are typically informative fields that allow the client and reviewer to communicate with each other and for the client to establish how seriously any errors in the model are rated by the reviewer. The client in turn can respond to particular issues that the reviewer has raised by including his responses in the "Client Response" field.

Array Formulae Analysis is performed with Unique Formulae Analysis. Array formulae are reported by the array area they occupy. Each new array area is reported as a unique formulae in the Unique Formula Listing, and can be identified from the following aspects: 1) UFIs are prefixed with an "A"; 2) formulae are surrounded by curly brackets ("{}"); and 3) Array Range column is populated with the relevant array areas. Note that for data tables, the array range includes one row above and one column to the left of the formula range. E.g. if the {TABLE(...)} formulae are in range \$C\$3:\$D\$10, the array range will be \$B\$2:\$D\$10.

Array formulae add a much higher degree of complexity to a model review, as they are more difficult to interpret than ordinary formulae. If array formulae are identified within a model being reviewed, the reviewer should ensure that the review of the array formulae sections is conducted by individual(s) with experience and understanding of how array formulae operate.

### **2.3 Maps**

The map option produces a coloured map of the model using the following keys:

F: Unique formula

<: Formula is a copy of the one to the left

^: Formula is a copy of the one above

+: Formula is a copy of the one to the left and above (i.e. it is a copy of both)

L: Label

N: Numeric input

A: Unique array formula

If array formulae are identified, the maps produced indicate the array areas by surrounding them with thick borders.

It is recommended that Maps be run and reviewed during the first and last review of a model to identify instances where:

- 1) The copy direction of a formula changes part-way through a row.
- 2) There is a blank cell or an input value cell within a range of copied (i.e. non-unique) formulae, but this does not result in a new unique formula being reported in the UFL, e.g.

F < < < <

^ +   ^ +

The absence of a formula in the third cell of the second row should be identified by a review of the maps and investigated accordingly.

### **2.4 Colour Unique / Inputs**

The Colour Cells option colours all unique formulae as purple and all numeric inputs as yellow.

Where a model contains its own colouring scheme that may conflict with MRT colours, it is recommended to use the colour removal options. These options allow cell backgrounds and text colours to be reset to "No fill" and "Automatic", depending on whether the check boxes are selected.

This removes all of the model's colours, including colours applied through "Conditional Formatting", before applying the MRT colours.