



**DATA
PUBLISHER'S
TOOLKIT**

Introduction

The Data Publisher's Toolkit (DPT) is an add-in for Microsoft Office that allows you to develop reports based on source data using Microsoft Excel and Microsoft Word.

When you install DPT, a new tab named DPT appears on the ribbon in Microsoft Excel and Microsoft Word. You can access DPT commands from this tab, as well as from various context menus (that is, right-click menus) throughout the applications.

Publishing Data – An Overview

Data analysts and M&E professionals need to produce high quality publications that are rich in data – presenting tables and charts to support the text, often referring to specific data values in the text of the document.

Often, these documents – such as an annual report – are similar in format. While the data may change, the arrangement of tables and charts may be consistent from year to year. The text however will change to reflect appropriate analysis of the current data.

Microsoft Word is a great tool for preparing professional attractively formatted documents. Excel is the premier tool for manipulating data and developing charts. And Excel charts and tables can be embedded in Word documents. But – how do we pull all this together in a way that lets you “re-use” a standardized Word format, easily pulling in up-to-date data, then editing text around it?

DPT is the “glue” that connects the pieces together.

Getting Data in Excel

We've seen throughout this manual lots of examples of Excel workbooks that link directly to source data. This data appears in the workbook as a table, or pivot table. When you refresh that table, Excel runs a query on the source database, pulling back the up-to-date data. This data is presented in the workbook.

Getting Excel Objects into Word

If you are a regular user of Word and Excel, you have probably copied tables or charts from Excel into Word by copy-and-paste. This lets you include Excel data in reports that you prepare in Word.

However, a simple copy-and-paste will only create a frozen copy of the Excel table or chart. If the Excel content changes, the copy already in the Word document does not reflect that change. You have to remove it, and copy-and-paste from Excel again.

A better approach is to paste a **link** to the Excel table or chart into Word. The link in Word is a reference to the Excel file. Now, when the Excel content changes, you can Refresh the linked object in word to pull in the latest version from Excel.

... from Database to Word...

Putting these two ideas together, you can see how we can get live links to source data inside a Word document:

- we build an Excel workbook that contains live links to the source database
- we create live links to that workbook inside our Word document.

To show the latest source data:

- we refresh the data links in Excel to pull the latest data into the workbook
- we refresh the linked objects in the Word document to pull in the latest versions of objects in the Excel workbook.

All these functions are built-in to Microsoft Office. But to join these tasks end to end, you need to perform a number of steps in both Word and Excel. DPT just helps to streamline this process.

Going Beyond the Basics

As well as smoothing the connections between SQL Server, Excel and Word, DPT extends Excel to provide richer presentations of data by adding new workbook functions.

In particular, you can easily pull data into a table or pivot table, but for publication purposes, you may want to have a more flexible format of numbers than this can provide. DPT lets us “dig numbers out” of a pivot table, and use these to create what we call *presentation tables* - formatted ranges suitable for inclusion in a report.

Dynamic Connections

As we've seen, Excel can define a connection to a database and pull that data into a table or pivot table. But these connections will always run the same query on the database. Excel does not give you a way to make the query dependent on some value (for example, an ward type or year) that is held in a cell in the workbook.

DPT overcomes this limitation. Using DPT you can construct *dynamic connections* that refer to worksheet values. In this way, you can, for example, make a table that lists all successful awards for a particular year. When you change the value for the year on the workbook, you can refresh the dynamic connection to show the awards for the newly selected year.

Working In Excel

Managing Data Connections

In Microsoft Excel, a *data connection* defines a connection to a data source that is used to get a table of data. this data may be displayed on a worksheet as a table, or else used to construct a pivot table.

New Connection The DPT New Connection dialog gives you a simple way to define a new connection to a SQL Server database. To define a connection, you give it a name, then enter the server, name of the database and the SQL statement to execute to get the data.

Note that this SQL statement can be any valid SQL that returns a recordset. It may be a single simple SELECT statement, a call to a Stored Procedure, or a script combining a number of statements.

To create a new connection:

❶ In the DPT Toolbar, click on

The Command Model DPT extends the basic Excel data connection by allowing you to include references to worksheet values inside the SQL statement that defines the connection. You do this by enclosing a defined name inside curly braces, like this

```
{selectedAwardType}
```

Where a reference like this is found in the SQL command, DPT replaces it with the value of the referenced worksheet name.

In this way, when you refresh the connection, the data set returned will reflect the current value of the worksheet name.

Refreshing Connections You should note that the built-in Excel Refresh command does not understand how to interpret these DPT references. You must use the DPT Refresh command to make use of the worksheet reference in the query.

Linking to Word

In DPT, the **Send To Word** command creates a link to the current selection in Excel inside the currently active Word document. This lets you build links, with the optimal settings, with a single click. The linked object is placed at the current insertion point in Word.

The link that is pasted in Word depends on what is currently selected in Excel, as this table shows:

Excel selection	in Word	Name	Format
Chart / any part of a chart	Chart	name of chart object	Picture
Cell(s) in pivot table	Pivot table body	<pv>Body	Rich text
Cell(s) in table (list object)	Whole table	name of table	Rich text
Multiple cells	selection	name of selected range	Picture
single cells	selection	name of selected cell	unformatted text
picture	worksheet range enclosing picture	name of range	picture

To work effectively with links, it is important to understand how Word locates the linked object in the Excel source document. First, we need to look in some detail at Excel *defined names*.

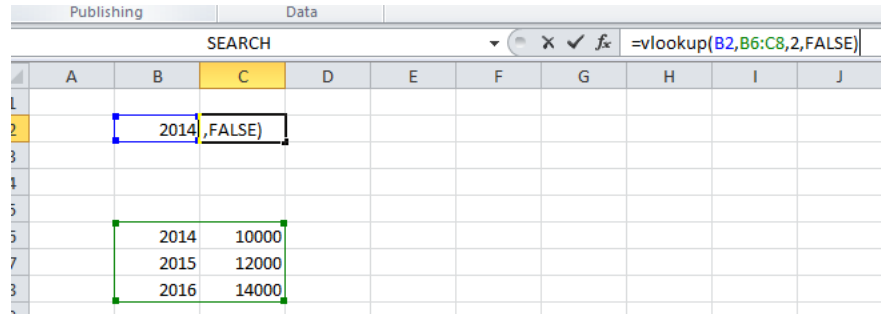
Names in Excel

When using Excel, it is recommended “best practice” to use a *defined name* (often called range name) for each important cell or range on your worksheet. You can use this name whenever you need to refer to that cell or range in a function. To create a name for a range simply type that name into the Name box, then press [ENTER](#).

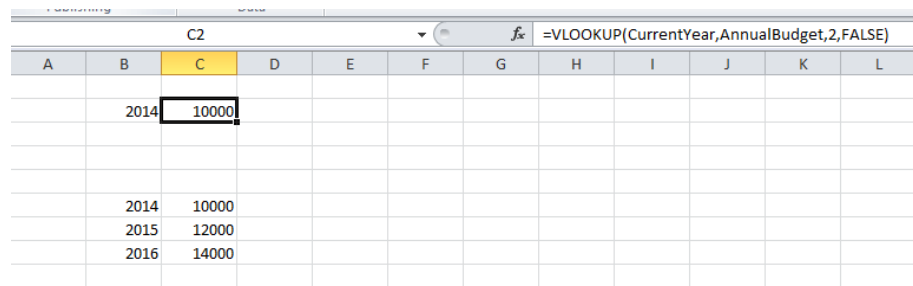
For example, here we have assigned the name CurrentYear to the selected cell B2:

		CurrentYear	
	A	B	
1			
2		2014	
3			

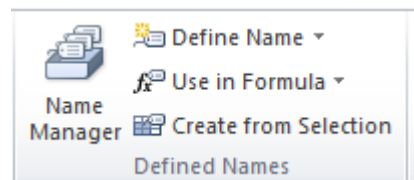
Using defined names in formulas makes the logic of the workbook much more clear. For example, consider this formula:



Its purpose is much more clear if we apply names to cells \$B\$2 (CurrentYear) and the range \$B\$6:\$C\$8 (AnnualBudget):



In the **Formula** tab, Excel provides a number of tools for working with defined names:



You should become familiar with these functions to make the most of Excel and DPT.

Linking and Names

For each object linked from Excel, Word stores this information:

- the type of link – this can be either Excel Range or Excel Chart
- the full path to the source workbook;
- the linked sheet in the source workbook;
- a reference defining the specific range or chart on that sheet.

When you are linking to a worksheet range, Word can simply use the cells references in usual row / column format; e.g. \$D\$7:\$G\$8

However, this is a bad idea. Unlike worksheet formulas, this link definition will not change if you insert or delete rows or columns into your workbook. Your link will stay the same and point to the wrong area.

The better approach is to use a *defined name* (often called range name) for any range you want to link. This protects your link from changes to the structure of the worksheet.

If you use **Send To Word** to create a link to a range that does not have a name, DPT creates a name for you, in the form *LinkedRange<n>*. That name is then used when constructing the link.

The screenshot shows an Excel worksheet with a table. The Name box at the top of the window displays 'LinkedRange1'. The table is located in the range C3:F6 and contains the following data:

Type	M	F	Total
LTA	20	24	44
SCA	16	18	34
Total	36	42	78

However, the best practice is for you to name the range before you link it to Word. That way you can have a meaningful, descriptive name to each of your linked ranges.

The screenshot shows the same Excel worksheet as above, but the Name box at the top of the window now displays 'AwardTotalsTable'. The table data remains the same:

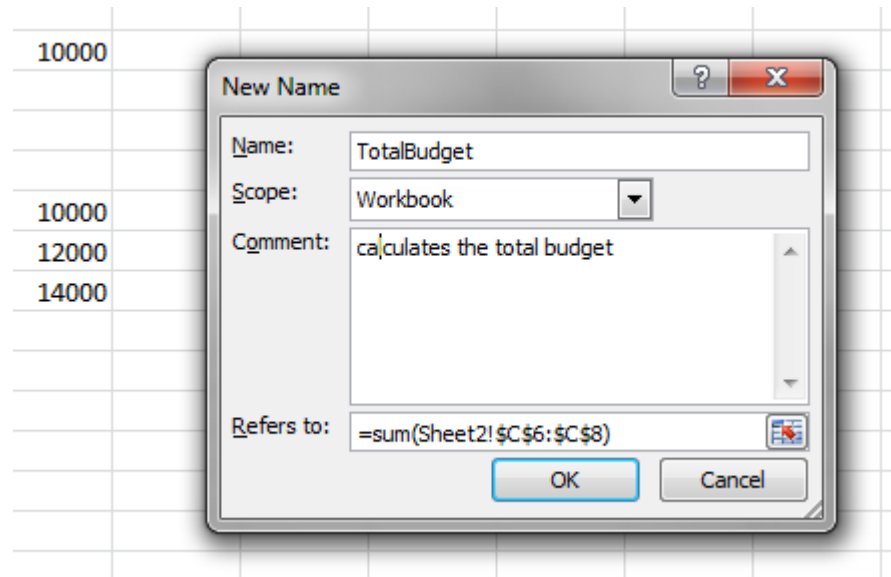
Type	M	F	Total
LTA	20	24	44
SCA	16	18	34
Total	36	42	78

Names for Formulas

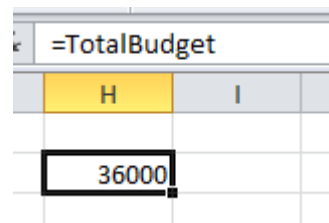
As we've seen, by typing a name in the Name box, you can create a defined name that refers to a cell or range on the worksheet. But you can also define a name that refers to a formula. To get the value of that name, Excel calculates the formula linked to that name.

Put another way, you can create a name to represent anything that you can type in a worksheet cell - a number, a cell reference, a piece of text, or a formula.

You use the **Name Manager** command in Excel to create these more unusual types of names. This example shows a name associated to a function:



and here we use that name in a formula:



DPT exploits this advanced use of names when you create a link to a pivot table or table. When you **Send To Word** with the selected cell inside a pivot table, DPT:

- recognizes that you want to link the pivot table body;
- defines a name that is linked to a formula that returns the range holding the pivot table's body;
- builds the link in Word using that defined name

When you refresh that link in Word, Excel recalculates the value of the name from its formula. this will return the *current* body area of the pivot table. So, the link in Word will display the entire body of the pivot table even if the pivot table changes size and shape when it is refreshed.

Applications					
	LTA	PHD	SCA	SCA2	Grand Total
2011	19	9	361		389
2012	2601	66	1138	73	3878
2013	4334	219	3577		8130
2014	5131	388	2238		7757
2015	4267	100	125		4492
2016	201				201
Grand Total	16553	782	7439	73	24847

The defined name that is created for this formula is <pivottablename>_TableRange1

So, it is good practice to give each pivot table you create a descriptive meaningful name, using PivotTableName box in the **Pivot Table Design** tab:

Applications					
	LTA	PHD	SCA	SCA2	Grand Total
2011	19	9	361		389
2012	2601	66	1138	73	3878
2013	4334	219	3577		8130
2014	5131	388	2238		7757
2015	4267	100	125		4492
2016	201				201
Grand Total	16553	782	7439	73	24847

Word Links

In this section, we look in detail at the *link fields* created in Word when you use the **Send To Word** function of DPT. Understanding Word links can help you to make customisations to the link, and to debug any problems that occur when you refresh the link.

In Word, a link to Excel is embedded in the document as a *field*. Think of a field as being a formula or calculation that Word performs to determine what to insert in the document at that point. Fields can be simple, such as a page number or date stamp, or more complex, such as a table of contents or Excel link.

All fields have two aspects:

- the field code - a “formula” which specifies how to calculate the result; and
- the field result - the output to display in the document when the code is calculated.

Normally, Word shows only the field result. However, You can use the key combination **ALT-F9** to switch back and forth between Field Code View and Field Result View. To change the view for just the currently selected field, use **Show/Hide Code** from the DPT tab in Word.

Word can also make it easier to identify fields by shading them. This command is tucked away in Options, so DPT makes it easier to access by putting it on the DPT tab in the ribbon. You can choose between:

- Never shades fields;
- always – shade all fields all the time;
- when selected – shade fields that are in the current selection.

Take advantage of this command to understand where your field are in the document.

Anatomy of a Link field

When you look at an Excel link field in code view, you'll see something like this:

```
{ LINK · ExcelSheet12 · C:\\Files\\AwardNums.xlsx · Sheet3!AppNumbersPivot_TableRange1 \\p }
```

All field codes begin with the type of field. This field is a LINK. The remainder of the field code holds everything Word needs to know to get the linked Excel content. In order, it shows:

- the type of content – Excel sheet content;
- the path to the workbook;
- the name of the worksheet in that book;
- the defined name that specifies the content;
- the format to use for the link: \\p means “picture”.

A couple of things to note:

- the field code is enclosed in bold curly braces { }. These can't be edited. Selecting one of these braces selects the entire field.
- The \\ character in the file path must be repeated.
- If there are spaces in the file path, then the whole path is enclosed in quotes.
- The sheet and defined name are separated by an exclamation mark (!).

In Field Code view, you can edit this code manually if you wish. The most common reason you may find to do this is when the source Excel workbook is moved to a new folder.

Once you have edited the code, you'll need to press **F9** to “update” the field; that is, recalculate the field result from the field code.

To edit a link field manually:

- 1 Select the field in the document.
- 2 In the DPT tab, click on [Show / Hide Field Code](#).
Word displays the field in Code view.
- 3 Edit the text inside the field braces {}.
- 4 Press **F9** to update the field.
- 5 Click [Show / Hide Field Codes](#).

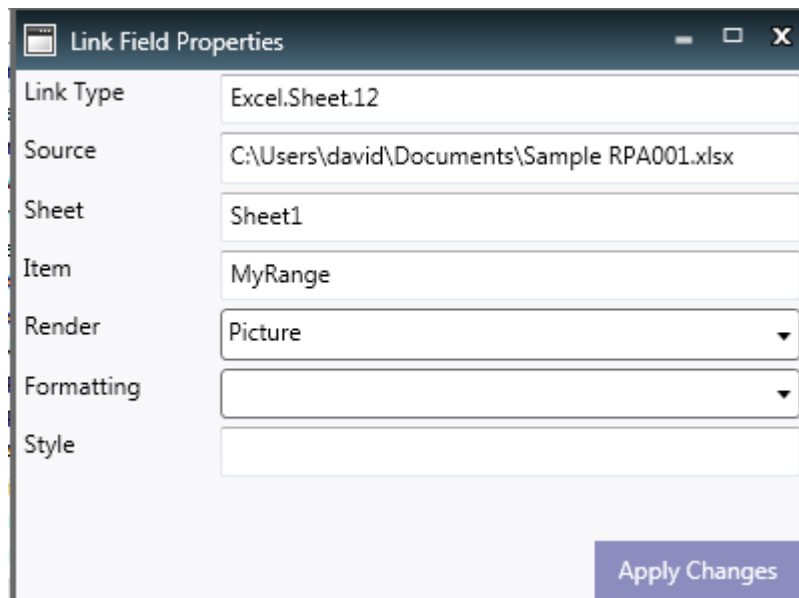
**Editing Fields with DPT**

DPT gives you some simpler ways to edit the link fields in your document.

To edit a link field using DPT:

- 1 Right-click on the field, then select **DPT Edit Properties...** from the pop-up menu.

Word displays the DPT Link Properties dialog.



- 2 Edit the settings.
- 3 Click on [Apply Changes](#).

DPT updates the field according to your changes.



To change the location of a workbook in all affected fields:

- ❶ In the **DPT** ribbon in Word, select **Excel Links**.
DPT displays the Excel Links Dialog. This shows every workbook that your document is linked to, and the number of links to that workbook.
- ❷ Edit the document name as path to point to the correct location of each workbook.
- ❸ Click on [Apply Changes](#).



We recommend that you keep your publication document and its linked Excel documents in the same folder, separate from other files.

Then, you can use the [Set to Document Path](#) command to change the path for each linked workbook to match the folder of the current document.

This makes it easy to move the whole project to a new computer or location.

Updating Fields

You can use the Word shortcut **F9** to update fields in your current selection. Word may not always update fields in headers and footers or in text boxes, so to be sure you have updated **all** fields in the document, use the **Update Fields** command from the DPT tab. Update Fields also applies any style you have associated to a linked table.

NOTE You can set an Option in Word Options to force field codes in headers and footers to be updated when you print.

Link Format and Styles

This section discusses how to use the formatting options on link fields to get the best results in your Word document.

When your link field is updated, the result can be pulled into Word in any of these formats:

- picture;
- bitmap;
- Rich text;
- HTML;
- plain text.

Picture

Picture format includes the Excel content as a vector image. That is, it appears as a picture object in your Word document. As a vector image

(specifically a *Windows Metafile*) it can be resized without loss of clarity. Picture is the best format to use for small tables, and for charts.

Bitmap The Excel content is included as a bitmap. This will generally be larger than a picture, which can be a consideration if you have lots of links in your document. The bitmap may lose clarity or appear jagged if it is resized.

Rich Text Rich text is the native data format of Microsoft Word. When you import an Excel range as Rich Text, you'll get a table in the field result in Word. With care, you can apply formatting to this table, and resize columns. Although you can edit text in the table, the next time you update the field, the content will be pulled back from Excel, and your edits will be lost.

Rich text is the best format for objects that may change length, such as lists or pivot tables, or for ranges that may not fit on a single page in your Word document. The Rich Text may split across pages - a picture will need to be scaled to fit on a single page.

HTML Like Rich Text, HTML format renders the Excel content as a table. Usually Rich Text is a better option, however HTML may give better matching of colours. You should experiment to find the better solution for your context.

Plain Text Plain text incorporates the Excel content as unformatted text. Plain text can sit in-line with text in your Word document. This is the preferred format for links to single cells. Such links are most often used to incorporate a number or sentence into the text of your document, that depends on your source data.

This table sums up these options:

		Formatting from...	Resize	Split Across Page	Editable
Picture	Picture object	Excel	Yes	No	No
Bitmap	Picture object	Excel	Lose quality	No	No
Rich text	Table	Excel / Word	No	Yes	Yes*

HTML	Table	Excel / Word	No	Yes	Yes*
Plain Text	test	Word - formatting of paragraph	Font size in Word	Yes	Yes*

Linking Tables

Using DPT, you can import a table from Excel into Word. This list may be linked to the SQL database, and the number of rows in the list may change when the connection is refreshed. Such as list may be too long to fit on a single page in your Word document, and may split across several pages.

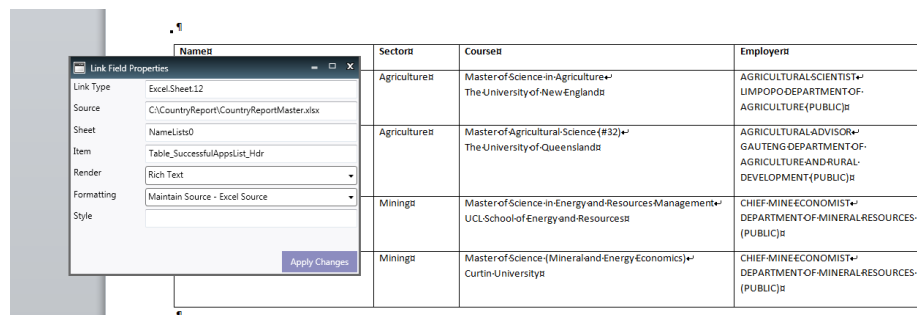
When deciding how best to format such a table, you have a number of choices. Unfortunately, the interaction between Excel and Word is complex, and it can be frustrating to see your carefully applied formatting lost the next time you update your field codes.

This section discusses the available options.

When you import an Excel range as Rich Text or HTML, Word needs to decide whether to keep the formatting on that text from Excel, or apply the formatting in Word. A specific field option controls this:

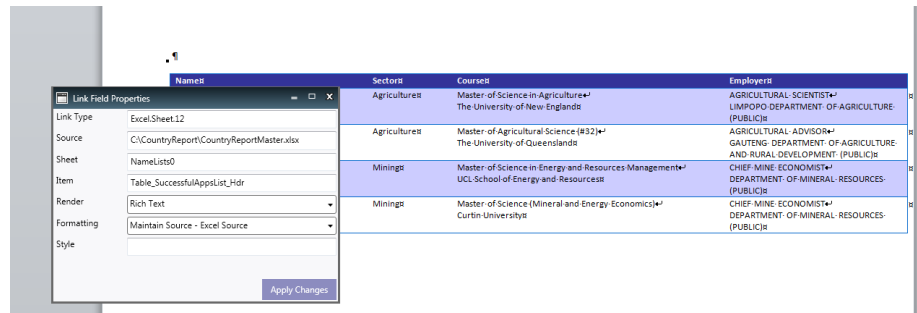
To keep formatting from Excel:

- 1 Rich-click on the imported table in Word, then select **DPT Field Properties**.
- 2 In the **Formatting** dropdown, select *Maintain Source – Excel Source*.



- 3 Click **Apply Changes**.

DPT updates the link field with the new setting:



Using the Excel formatting is the simplest way to get some formatting on your table in Word. *Maintain Source – Excel Source* and *HTML* options are the defaults used when you first send the table to Word.

Formatting with Styles Excel provides a wide range of predefined styles you can apply to a list. By default, DPT keeps this formatting when you Send To Word.

You can build your own table styles in Excel to main consistent formatting across a collection of tables. In fact, this lets you use some capabilities not exploited in Excel's defaults, such as total rows and columns, and column stripes (Excel's defaults use row stripes).

You can also apply formatting directly to a table column. Be sure to select the column by clicking on the column header when you do this – that way Excel understands that your formatting applies to the column (which may get longer when refreshed), not just the cells currently in the column.

You can apply one-off formatting to any cell or range in the list. However, this formatting will apply to the position in the table, and so may not refer to the same data when the list is refreshed from your source database. A better approach to highlight particular values is to use *Conditional Formatting* in the list. This formatting can refer to values in each row, and will be recalculated whenever the list is refreshed.

Refer to Excel's documentation for details on conditional formatting options.

Styles in Word You can apply styles to the linked table directly in Word, although this approach is not recommended. If you change the formatting option to *Use Destination – Excel Source*, DPT will attempt to maintain Word styles when the list if refreshed.

Column Widths When you first work with linked tables, column widths may seem particularly confusing. Word and Excel interact to determine the column widths of each row in this way:

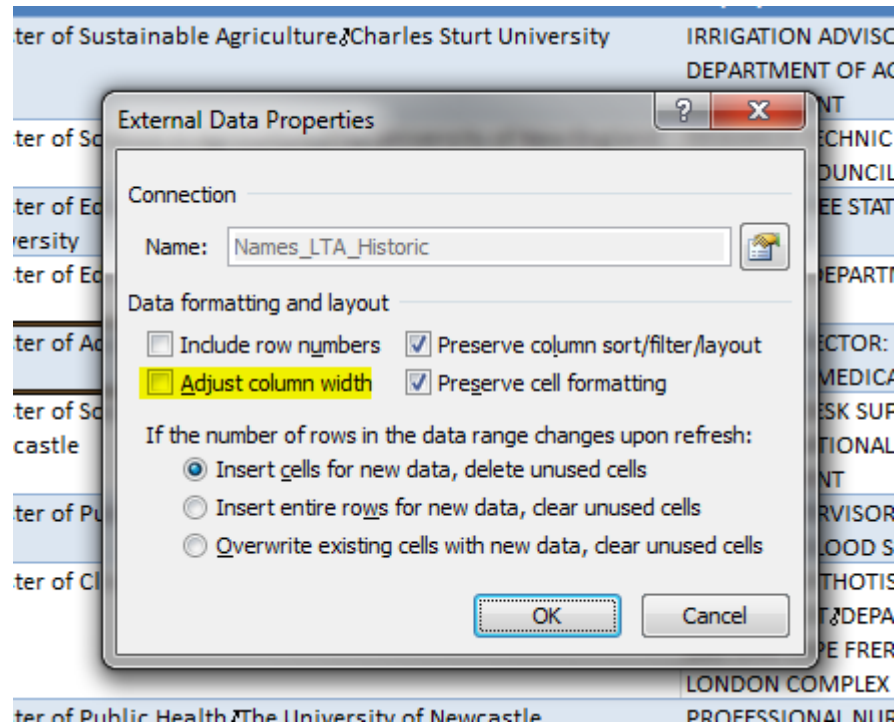
- When you first create the linked table, the column widths in Word are imported from Excel.
- If you change the columns widths in Word, those new columns widths are preserved when you update the link **for the rows that already exist in the table.**
- If new rows are added to the table when you update the link, the column widths in those new rows are imported from Excel.

What this means is that your best approach is to get the column widths set up in Excel, and **not** try to adjust these in Word. This may take a little trial and error to get the result you want.

As well, you do need to make sure that refreshing the table in Excel does not change the column widths! Excel's table options control this:

To fix the width of columns in an Excel list:

- 1 Right click on the list, and choose **Table ► External Data Properties** from the pop-up menu.



- 2 Make sure the option **Adjust Column Widths** is Off.
- 3 Click **OK**.



Format to Publish

Adjusting then fixing column widths is just one of the changes you may want to make to your Excel list to prepare it for publication in a Word document. For example, you will most likely want to align text to the top of cells.

The DPT command Format To Publish tweaks various settings of your table that make it more predictable when it is linked into a Word document.

To format a table for publication:

- ❶ In Excel, select any cell inside the list, then right-click to display the pop-up menu.
- ❷ Click on [DPT Format To Publish](#).
DPT adjusts the list settings.


Repairing Column Widths

DPT does provide you with a fix if your linked table does end up with rows with column widths.

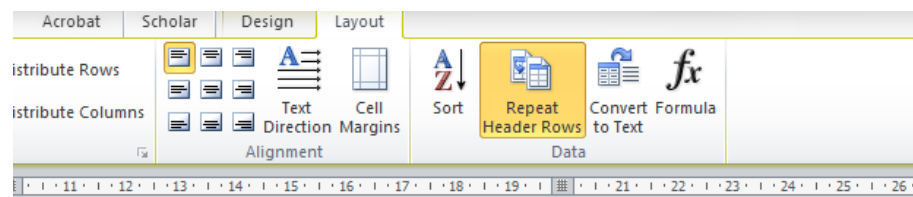
To fix up column widths in Word:

- ❶ Select any cell in the table, and right click to bring up the pop-up menu.
- ❷ Select **DPT Fix Column Widths**.
DPT changes the table so that all rows have the same column widths as the first row.


Repeating Headers

When a table splits across multiple pages, you will probably want to repeat the header row on each page.

Word tables can support one or more repeated header rows, but Excel lists do not. In Word, you use the [Repeat Header Rows](#) command in the **Table Layout** tab to force the selected rows to repeat on each page.



Course#	Employer#
Water-harvesting-and-small-scale-irrigation#	IRRIGATION-ADVISOR#
The-University-of-New-England#	FREE-STATE-DEPARTMENT-OF-

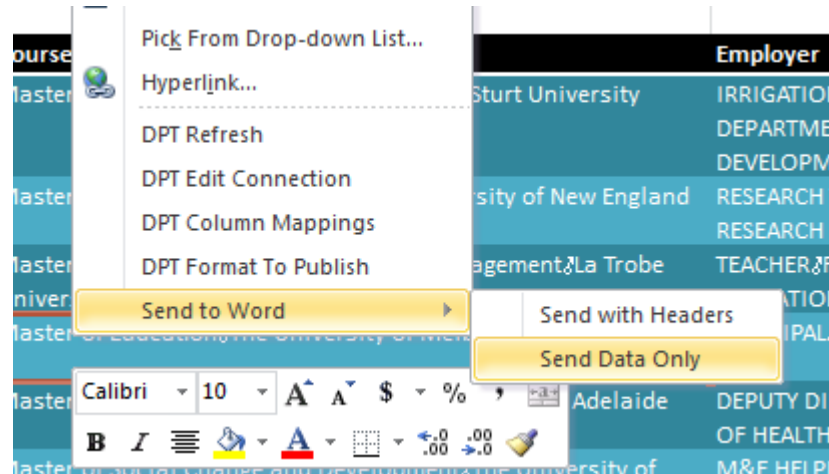
You can apply Header rows to a linked table in this way, but unfortunately, these repeated header rows are lost whenever the link is updated.

To get around this, update links using the [Update Fields](#) in the **DPT** tab. This command applies one repeated header row to the top of the linked list.

Similarly, you can update single link field using [DPT Update Link](#) from the pop-up menu.

List without headers

If you want a list without headers, you can use the **Send To Word ► Send Data Only** command from the list pop-up menu:



This option sends the list to Word the list without its header row. When you update the resulting link, the repeating header is not applied.

To update a single linked table:

- ❶ Click any text inside the table, then right-click to display the pop-up menu.
- ❷ In the pop-up menu, click on [DPT Update Link](#).

DPT updates the link field, preserving the repeating header row and table formatting.



Linking to Pivot Tables

DPT lets you create a link to a pivot table in your Word document.

When your selection in Excel is in the body of a pivot table, clicking **Send To Word** sends a link to the whole pivot table body into your Word document. Furthermore, this link will always reflect the current body of the pivot table. If the pivot table grows or shrinks when it is refreshed, or if you reorganise the row and column fields, the new pivot table body is displayed in Word when you update the link.

Row Labels	Sum of Number
Agriculture	36%
Education	3%
Environment	6%
Governance	28%
Health	13%
Mining	7%
Other	4%
Water and Sanitation	3%
Grand Total	100%

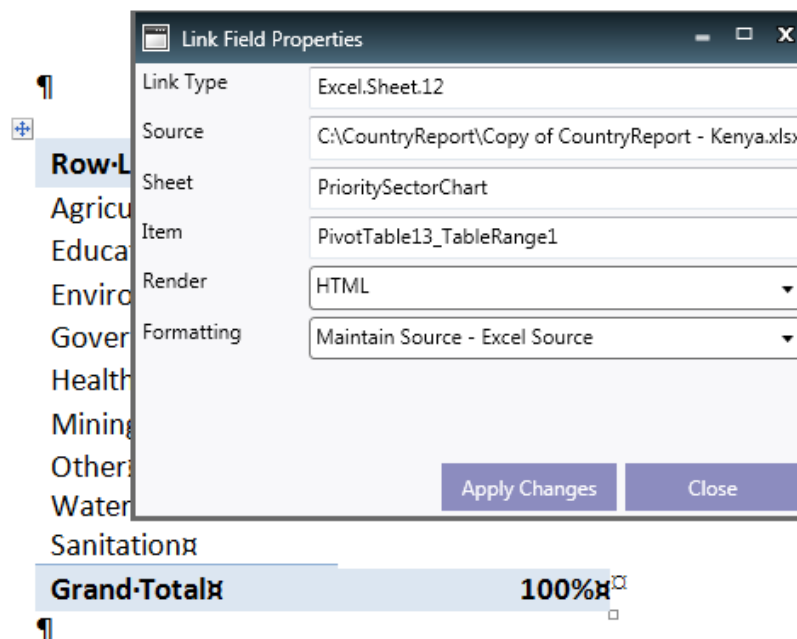
The pivot table is linked in Word as a *picture*. However, you can change this default using the **DPT Link Properties** dialog. This is useful if your pivot table is too large to fit on a single page. In that case, change the format to HTML, and the pivot table will appear as a table in your Word document.

Row-Labels	Sum-of-Number
Agriculture	36%
Education	3%
Environment	6%
Governance	28%
Health	13%
Mining	7%
Other	4%
Water and Sanitation	3%
Grand Total	100%

Formatting Pivot Tables

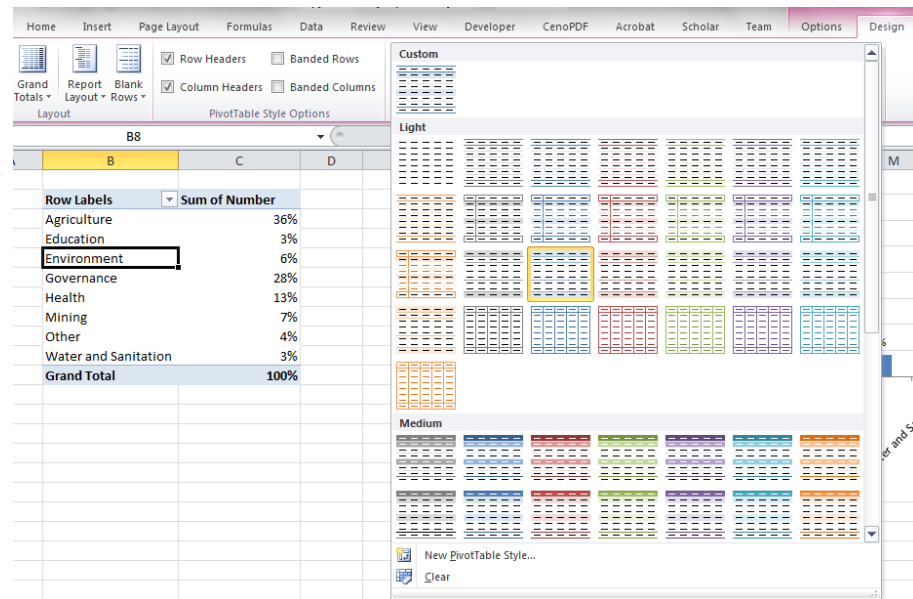
As we have seen with tables, you are usually best advised to format the appearance of the pivot table in Excel, and have that formatting reflected in Word. The Excel format will always be preserved if you link the pivot table as a *picture* (the default option).

If you change the Link format to HTML or Rich Text, the Excel format is preserved when you selected the option *Maintain Source - Excel Source*.

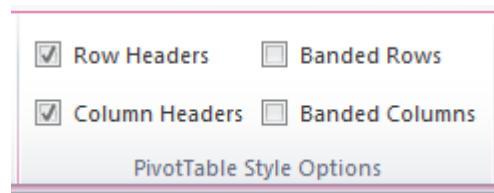


In this section we give an overview of the options available to format your pivot table.

Built-in styles Excel provides a palette of styles you can easily apply to your pivot table from the Pivot table Design tab.

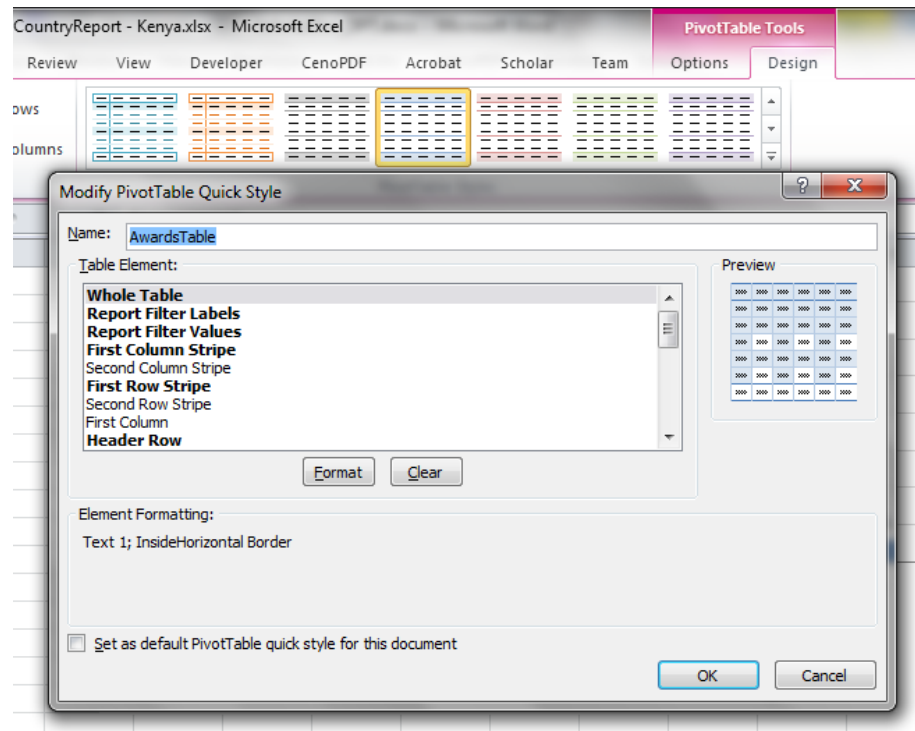


Style Options Once you have applied a style, you can configure its application by selecting or deselecting these options:



Custom Style You can create a new style by clicking **New Pivot Style** in the Style palette (see above). However, it's usually more efficient to select an existing style, then right click and select Duplicate. this creates a new style that is a copy of the original.

From there, you can modify the style by changing font's borders and backgrounds for the various table elements:



Styles Applied to Fields

You can apply formatting to the collection of pivot items for a selected pivot field. This formatting is overlaid over any pivot table style. The field will remember its formatting as the table is refreshed or when the field is moved to a different location.

This is the best way to solve a common requirement for vertical text in column headers.

To create vertical column headers:

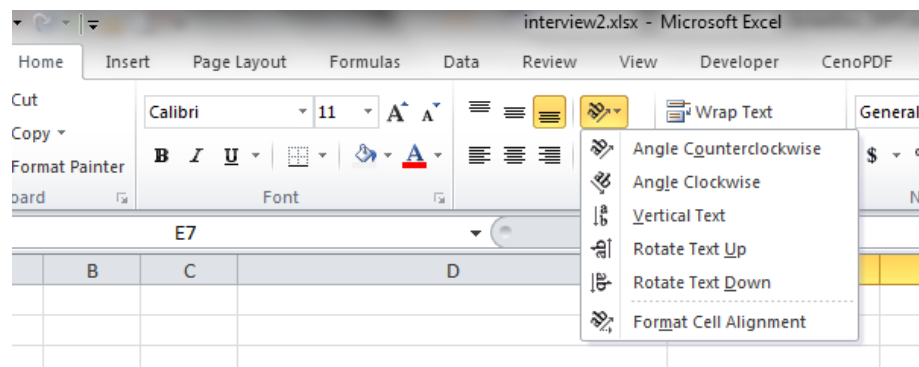
- 1 Change the report to Tabular view, and make sure the field header for the column field is displayed, like this:

InstitutionChanged	1			
Count of sSurname	PrioritySector			
acaFinal1Inst	Agriculture	Education	Envi	
Australian National University (ANU)				
Carnegie Mellon University				
Charles Sturt University			5	
Curtin University				
Curtin University of Technology (Curtin)			2	
Deakin University				
Flinders University				2
Griffith University				
James Cook University			1	

- 2 Click at the top of the field header, so that the collection of items is selected:

	1			
	PrioritySector			
	Agriculture	Education	Environment	Governance
...y (ANU)				1
		5		

- 3 Format the selection to show vertical text, using the **Orientation** command in the **Home** ribbon.



- 4 Clean up the presentation by resizing the columns, and applying a style. Use DPT Simplify to switch back to Compact layout and remove the table buttons.

Count of sSurname									
	Agriculture	Education	Environment	Governance	Health	Mining	Other	Water and Sanitation	Grand Total
Australian National University (ANU)			1	2					3
Carnegie Mellon University				1					1
Charles Sturt University		5							5
Curtin University				2	1				3
Curtin University of Technology (Curtin)	2			1	2				5
Deakin University				1					1
Flinders University		2	1	3			1		7

- 5 Send to Word to publish your formatted table.



Style Applied to an Item

You can even apply a pivot style to a single pivot item within a pivot field.

Click on the pivot item header to select all its data.

re	Education				Environment			Governance			
		%	No		%	No		%	No		%
15	9.6%	4	4	6.2%	1	1	1.5%				
30	19.9%				3	3	4.5%	10	10	7.0%	
3	1.9%				3	3	4.5%	8	8	6.0%	
5	3.8%	9	9	13.8%	8	8	11.9%	10	10	7.0%	
7	5.1%	4	4	6.2%	5	5	7.5%	6	6	4.0%	
8	5.1%	5	5	7.7%				12	12	9.0%	
18	11.5%				15	15	22.4%	9	8	6.0%	
2	1.3%	3	3	4.6%				3	3	2.0%	

Apply any styles you want to highlight this item.

Pivot tables offer many opportunities for flexible formatting and for in-depth calculations with your Source data. Using these options, you can create attractive and insightful tables that you can dynamically link into your reporting publications.

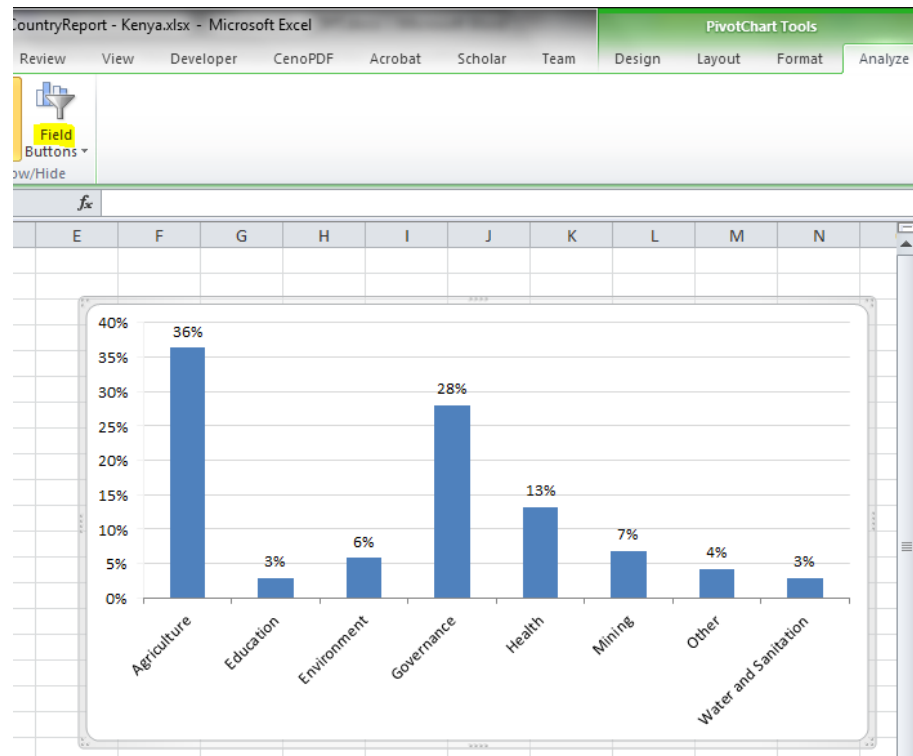
Pivot Charts

Perhaps the simplest way to include a data-driven chart in your Word publication is to publish a Pivot Chart.

When you select a pivot chart in Excel, then click Send to Word, DPT embeds a link to the chart in your Word document. This chart will change as you refresh your data links in Excel and update links in Word.

Formatting a Pivot Chart

You'll want to turn off the display of the interactive buttons before publishing your chart in your Word document. To do this, use the **Field Buttons** command in the Pivot Table **Analyse** ribbon.



As well, use the DPT Simplify command from the chart shortcut menu to remove lines and borders to create a cleaner, simpler chart.

Of course, you can use any of Excel's built-in chart templates, and chart formatting options to control the appearance of your pivot chart.

Presentation Tables

We have seen how to link lists and pivot tables into your Word publication. These items are linked directly to your source data, and may change shape and size when the data is refreshed.

While this is the most direct way to publish SQL data, there may be occasions where the formats available in pivot tables or lists are not flexible enough for your purposes. For example, you may want to include data from more than one source in a single table, or have some specific scheme of totaling not available in a pivot table.

In these cases you'll need to create a *presentation table*.

A presentation table is simply a range in your workbook that you configure and format for presentation in Word. You give this range a name, and use Send to Word to link it in your Word publication. When you Send a rectangular range that is not part of a list or pivot table, DPT links it as a picture in Word.

To create a presentation table, we need to solve one key issue: how do we get that source SQL data into that table? Of course, we want the data in the table to be updated when we refresh the workbook's data links.

Pivot Mining

A pivot table built on a connection to the source database imports a cache of data that we'd like to be able to access to find specific data values. Pivot mining refers to this process – extracting single values from the pivot table to use in cells elsewhere in the workbook.

getPivotData Excel has a built-in function `getPivotData` that lets you extract a value from a pivot table. You'll notice that if you attempt to create a formula that references a cell in a pivot table body, Excel does not insert a reference to the cell's position (e.g. `D8`) – rather, it creates a `getpivotData` formula describing the pivot fields that generate the value, like this:

ingYear	Gender	
	M	F
2013	0	1
		1
		1
		1
		1
	0	1
		4

`=GETPIVOTDATA("Number",D8,"awardFundingYear",2013,"AwardType","LTA","Gender","M","instName","The University of Adelaide","CountryName","South Africa")`

AS you can see, get Pivot Data lets you take a value from the pivot table, and place it wherever you want in your workbook. When the pivot table is refreshed, the getPivotData function will also be refreshed. By referring to the pivot items that define the value, the function still returns the correct value even if the pivot table changes size and shape.

pvSum However, getPivotData has a significant limitation: its selection criteria must return a single cell in the pivot table. If getPivotData selects no cells, or more than one, it returns the error #VALUE.

pvSum is a workbook function defined in DPT that extends getPivotData may select more than one cell from the pivotTable. The value returned by pvSum is the sum of this selected range. If no cells are selected by its selection criteria, it returns Empty (0).

This means that you can set up a pivot table with a variety of row and column fields, and aggregate values from this pivot table in many different ways. To achieve the same flexibility using getPivotData only, you would need to create a number of different pivot tables based on the same pivot cache.

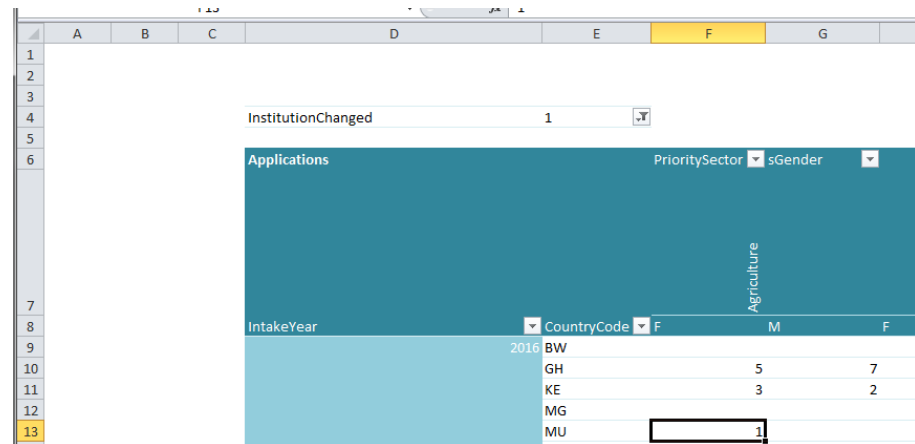
If you intend to distribute your workbook to third parties who are not using DPT, then you should probably stick to using getPivotData. Otherwise, the recipient of your workbook will not be able to recalculate the pvSum formulas.

**Getting Started
With pvSum**

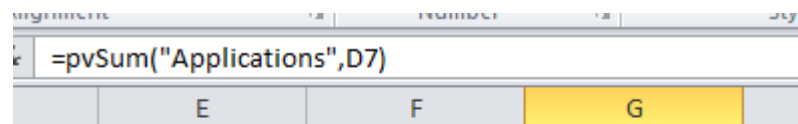
pvSum has the same function arguments as getPivotData – this makes it easy to upgrade existing formulas that use getPivotData to use pvSum.

To begin, you need a pivot table set up to be a “data mine”. That is, you layout this pivot table with all the fields that you may want to aggregate by appearing as either a row or column field. then use DPT Layout=>Flatten to create a tabular table.

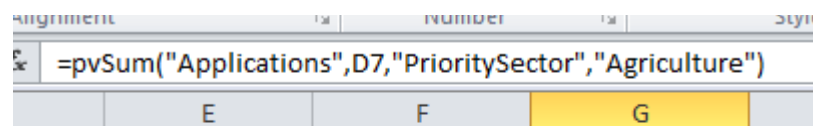
This example shows a table split by year, country code, PrioritySector and gender:



The simplest pvSum can calculate the grand total of the data field *Applications*. The second argument (D7) is a reference to a cell contained in the pivot table. Generally, you’ll point this to the top left corner, since this cell will always be in the pivot table no matter how it changes shape. This refe



By adding a selection field, we can find the total for *Agriculture* only:



This example selects Agriculture, in Ghana (GH):

Application	Number	Style	Cell
=pvSum("Applications",D7,"PrioritySector","Agriculture","CountryCode","GH")			
E	F	G	H
		12	

We can refer to a cell containing a search value, by reference or name. Here we refer to SelectedCountryCode:

Application	Number	Style	Cell
=pvSum("Applications",D7,"PrioritySector","Agriculture","CountryCode",SelectedCountryCode)			
E	F	G	H
		MU	
		1	

You can refer to more than one value by separating them with a pipe | character:

Application	Number	Style	Cell
=pvSum("Applications",D7,"PrioritySector","Agriculture Environment","CountryCode","GH")			
E	F	G	H
		MU	
		14	

Alternatively, you can refer to a range of more than one cell, like this:

Application	Number	Style	Cell
=pvSum("Applications",D7,"PrioritySector","Agriculture Environment","CountryCode",H1:H2)			
E	F	G	H
			GH
			KE
			19

Using a relative cell reference makes it quick to set up a simple table. Here the pvSum formula in column G points to gender M. this formula is copied into column H, to show the total for gender F:

Application	Number	Style	Cell
=pvSum("Applications",E7,"PrioritySector","Agriculture Environment","CountryCode",I1:I2,"sGender",H\$3)			
E	F	G	H
			GH
			KE
			F
	M		9
			34

Using pvSum in this way you can easily design presentation tables that are built from data “mined” from your pivot table, and therefore directly connected to your source database. When you have constructed such a table, click [Send to Word](#) to publish the result.

To publish a presentation table:

- ❶ Create your presentation table, using pvSum formulas to mine data from your pivot table (or tables).
- ❷ Apply any formatting you want to the presentation table.
- ❸ Select the entire table, and give the region a Defined Name.
- ❹ Click [Send to Word](#).

DPT sends the presentation table to your active Word document as a linked picture.



Text Content

As well as the objects we have examined so far – tables, pivot tables, chart, presentation tables – you may want to incorporate values from the source data directly into the body of your document text. For example, you may want to state:

Scholarships were awarded to 127 female applicants.

Here the number 127 is sourced from the Source data, and we would like to be sure that this number updates whenever we change our source data.

We can achieve this by:

- using pivot mining (that is, a pvsum formula) to extract the value we want from a pivot table;
- giving the cell that holds that value a name;
- using Send to Word to send that single cell.

When you link a single cell to Word, DPT inserts it as **text**. This means it flows within the paragraph where it is placed, and takes on any formatting applied to that paragraph, or applied to the field code itself.

Linking Sentences

Linking a number into a sentence as described above solves the problem of keeping the value up-to-date – but may create other problems of grammar when the data changes.

Consider our sentence:

Scholarships were awarded to 127 female applicants.

Suppose, when you refresh the data, the new value is 0 or 1.

You'll get this clumsy sentence:

Scholarships were awarded to 0 female applicants.

or worse, this ungrammatical one:

Scholarships were awarded to 1 female applicants.

Furthermore, if the number is small, its good style to show it in words:

A Scholarship was awarded to one female applicant.

Scholarships were awarded to five female applicants.

DPT's worksheet function **strXToWords** give you the means to build grammatical constructions that can overcome all these issues, creating the appropriate version of the sentence for each of these possible variations.

When you use strXToWord, you'll construct the sentence in an Excel cell, then link that cell into Word to import the entire sentence.

As you can see, this realises another problem: capitalisation. You can address this with the fourth argument to strXToWords - CapitaliseMode. This can take these values:

- L - lowercase
- U - uppercase
- C - capitalize

L is the default.

=strXToWords(I16,J14,10,"C")				
F	G	H	I	J
				{0} awards were made to females.
			7	Seven awards were made to females.

*Singular, Plural,
Zero Forms*

We still have one issue to address: how to use different grammatical formats for singular plural and 0 cases.

This is poorly:

0	Zero awards were made to females.
---	-----------------------------------

and this is plain wrong:

1	One awards were made to females.
---	----------------------------------

To overcome this , you can specify the template as a range of 1 column and three rows.

The first row is used when the number is 0. the second row is used when the number value is 1. The last row is used for larger values. In this example, the template argument in the strXToWords function points to such a 1x3 range:

=strXToWords(I16,\$J\$12:\$J\$14,10,"C")					
F	G	H	I	J	K
				No awards were made to females.	
				One female received an award.	
				{0} awards were made to females.	
			1	One female received an award.	

A value of 0 now gives this result:

0 No awards were made to females.

Note that the 0 and singular templates do not contain the placeholder {0}. It is unnecessary in these cases, because these templates are only used with the values 0 and 1 respectively, so we can craft the wording especially for these cases.

Using Other Variables

You can include other variables in your template by using additional placeholders {1}, {2}, {3}. You supply the values to use for these placeholders as extra arguments to strXWords. Here we pass the range name SelectedCountryName as argument 1:

=strXToWords(I16,\$J\$12:\$J\$14,20,"C", selectedCountryName)					
F	G	H	I	J	K
					In {1}, no awards were made to females.
					One female in {1} received an award.
					{0} awards were made to females in {1}.
				17	Seventeen awards were made to females in South Africa.

Notice how we have used {1} slightly differently in each template.

Formatting Numbers

Your placeholders can include a format specification used to format the number value inserted into the placeholder. A placeholder with a format looks like this:

{0: #,###}

with a colon separating the placeholder number from the format.

Percentages

You can handle the display of percentages in strXToWords using a more sophisticated arrangement of templates.

For a percentage, the range of possible values is 0 through to 1 (100%), so our 3 level arrangement of templates – zero, one, many – won't help us.


Instead we define the template as a 3 row by 2 column array.

The first column holds a percentage value, the second the template for that band of percentages. This works exactly the same as Excel's in-built VLOOKUP function.

this example uses this method to distinguish between 0, 1 (i.e. 100%) and any intermediate value.

Q	R	S	T	U
	=strXToWords(Q32,\$Q\$25:\$R\$30)			
0	No awards			
0.00001	{0: ##.00%} of awards			
0.5	Half the awards			
0.50001	The majority ({0:##.00%}) of awards			
0.9	Most ({0:##.00%}) of the awards			
1	All awards			
0.95	Most (95.00%) of the awards			
0	No awards			
0.2	20.00% of awards			
0.25	25.00% of awards			
0.5	Half the awards			
0.63	The majority (63.00%) of awards			
0.94	Most (94.00%) of the awards			
1	All awards			

Finally, you could consider creating a reusable template by incorporating a second placeholder. In this example, *awards* has been removed from the templates, and replaced with placeholder {1}. the value for this placeholder is supplied as an argument to strXToWords. (Note that the arguments for ConvertLimit and CapitaliseMode are not needed and not supplied.)

fx =strXToWords(Q32,\$Q\$25:\$R\$30,, "fellowships")						
Q	R	S	T	U	V	W
	0	No {1}				
	0.00001	{0: ##.00%} of {1}				
	0.5	Half the {1}				
	0.50001	The majority ({0:##.00%}) of {1}				
	0.9	Most ({0:##.00%}) of the {1}				
	1	All {1}				
	0.95	Most (95.00%) of the fellowships				
	0	No fellowships				
	0.2	20.00% of fellowships				
	0.25	25.00% of fellowships				
	0.5	Half the fellowships				
	0.63	The majority (63.00%) of fellowships				
	0.94	Most (94.00%) of the fellowships				
	1	All fellowships				
						

Charts

We have already described how you can link a pivot chart into your Word publication using [Send To Word](#). While this is the simplest way to present a chart derived from your data, there may be situations where you want to create a more complex chart that cannot be constructed as a pivot chart.

The strategy to create a chart begins with creating a presentation table as we have already described. That is, you create a range on a worksheet where you use `pvSum` to include data from a pivot table, perhaps with cells containing other calculations.

Once you have this data in place, you can use it to create a chart in the normal way. You can format this chart using Excel's regular chart tools, then use `Send To Word` to publish the chart in your Word document.

While not directly linked to the Excel data, a chart built in this way will still refresh when you Refresh Links in the workbook. That is because Refresh Links will update the pivot table, the changes to the pivot table will update the presentation range on which the chart is based, and so the chart itself will change. In Word, you can use Update Links to refresh the linked chart object.

Worksheet Functions

DPT provides a collection of useful functions that you can use in cell formulas in your workbook.

String Functions

These are functions for manipulating text.

NumberToWords Converts a number into words. For more options, use *strXToWords*.

strXToWords Convert a number to words with options:

number the value to convert.

capitaliseMode C: Capitalise
L: lower-case
U: upper-case
T: Title-case

ConvertLimit Values greater than the convert limit will be left as numbers.

PluralForm this expression is appended to the representation of the number, when the value is greater than 1

SingularForm This expression is appended to the representation of the number, when the value is equal to 1

ZeroForm This expression is used in place of the representation of the number, when the value is 0.

Quoting Values These functions are used for enclosing text in brackets or quote marks. They are primarily used to construct SQL statements from values in the workbook.

strXb Puts brackets around a number.

strXqq Enclose in double-quote

strXq Enclose in single quote. Equivalent to *strXQuote(..., "'")*

strXQuote Quotes a value.

R the value to enclose.

QuoteChar May be double-quote, single quote, or { [(

strXsql Represents a value in a format compatible with inclusion in a Sql statement. Encloses text values in single-quotes, uses NULL for empty call, dates are formatted yyyy-mm-dd and enclosed in single-quotes.

- Arrays** Used for working with ranges of text values.
- strXJoin** Joins an array of cells into a single string value.
- r Range to join
- sep separator character. Default is comma

PivotMiner

The functions in the pivotminer category provide enhanced ways of getting values out of a pivot table.

- pvSum** pvsum is an enhanced version of the inbuilt function getPivotData.
- Datafield** The datafield to sum. Not that this uses the name assigned to the Datafield. If the field name begins Sum Of... you can omit that Sum Of.
- PivotRange** Reference to a cell contained in the pivot table
- Fn, In** Field and Item. For each pair, Fn is the name of a row or column field of the pivot table, In is an item name or set of item names separated by |, a range containing an item name, or a multicell range containing a set of item names. Up to 10 pairs of Field/Item can be specified.
- PivotItems** The PivotItems function returns the names of the pivot items within a specified pivot field in a pivot table
- R** Reference to a cell contained in the pivot table
- FieldName** Name of the pivot field.
- The field referred to by FieldName need not be a row or column field in the current layout of the pivot table.
- PivotItems returns an array of strings, and so can be used as an array function on a worksheet. The calling range should be either 1 row or 1 column. The orientation (vertical/horizontal) of the function result is determined by the orientation of the calling range.

Font	Alignment	Number
C1	=pivotItems(D7,"PrioritySector")	
C	D	E
Agriculture	Education	Environment

Array Functions

This collection of function manipulate ranges and arrays.

- Distinct** The Distinct function returns an array containing the distinct values in the referred to range.
- r The range to search

of your workbook. Use RangeTrim instead of OFFSET when the values of height, width, top and left ensure that the result must always be a subset of the input.

r	Input range
offsetTop	Top row of output, relative to input (0 - based)
offsetLeft	Left column of output, relative to input (0- based)
height	Height of output range
width	With of output range

RangeTrim returns a reference to an Excel range.

RangeTrimA Like RangeTrim, but the result is a two dimensional array of variants. That is, the result of RangeTrimA is the value of the 2-dimensional range returned by RangeTrim.