A guide to...

...Presenting Data
This guide gives practical advice and guidance to people who need to present data – in tables, charts, maps or text. You may also want to look at:

- Data Collection & Validation
- Summary Statistics

We have produced a series of guides which covers four broad areas:

- Surveys
- Performance management
- Collecting and using data
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# Presenting Data

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1. Introduction

We will all face the challenge of presenting data at some time or another, whether for a simple report or to analyse a problem or service. As part of our series of guides, this document sets out some principles that will help you present your data so that your reader can understand it and, consequently, the overall message it presents.

Numbers should not be treated like our bank balances; with every last digit of the pence accounted for. Tables, charts and diagrams should help to interpret your data, and should represent your data well - and not, as often happens, hide or obscure the data’s meaning.

Many of the principles that we will cover in this document were taught to us in school, but we have forgotten some of the basics since technology was introduced.

This document is aimed at those involved in communicating statistics or the message contained within them. It covers interpreting information by non-statisticians, reporting on data - of any description - within organisations, and presenting a message to specific communities and to the general public.

The fundamental principles for presenting data can be summarised in four words:

- Clear;
- Concise;
- Correct; and
- Consistent.

If we follow these principles in all of our data presentation we will see an improvement in our readers’ understanding, and a much quicker appreciation of the data’s meaning – especially for those who often have little or no training in this field.
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1.1 Reference data and summarised data

We are concentrating on summarised data in this document and not reference data, though an example of a standard table that can be applied to reference tables in Annex 1.

Reference data can be defined as the raw counts of data which is the foundation of the summarised data.

Summarised data is data taken from the reference data, then rounded and extracted, but which doesn’t show the original data’s full detail.

As an example, look at this simple table of population data for Wales in the following reference table:

**Table 1: Population of Wales**

<table>
<thead>
<tr>
<th>Year</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1901</td>
<td>2,013,012</td>
</tr>
<tr>
<td>1911</td>
<td>2,421,265</td>
</tr>
<tr>
<td>1921</td>
<td>2,656,621</td>
</tr>
<tr>
<td>1931</td>
<td>2,593,982</td>
</tr>
<tr>
<td>1951</td>
<td>2,599,654</td>
</tr>
<tr>
<td>1961</td>
<td>2,644,211</td>
</tr>
<tr>
<td>1971</td>
<td>2,731,456</td>
</tr>
<tr>
<td>1981</td>
<td>2,792,935</td>
</tr>
<tr>
<td>1991</td>
<td>2,896,474</td>
</tr>
<tr>
<td>2001</td>
<td>2,903,085</td>
</tr>
</tbody>
</table>

An example of a summary table from this reference table could be:

**Table 2: Population of Wales**

<table>
<thead>
<tr>
<th>Year</th>
<th>Millions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1901</td>
<td>2.0</td>
</tr>
<tr>
<td>1921</td>
<td>2.7</td>
</tr>
<tr>
<td>1961</td>
<td>2.6</td>
</tr>
<tr>
<td>2001</td>
<td>2.9</td>
</tr>
</tbody>
</table>

It is much clearer to the reader what happened to the population from the data in Table 2:

- a steep rise to 1921;
- a small decline to 1961; and
- a small increase to 2001.

It is much harder to see the same message from the data in Table 1.
2. Presenting numbers

2.1 Effective digits

Many believe the basic principle that a human being can only discriminate up to two digits in numbers. This principle is essential for good presentation. As an example, look at the difference between the following two numbers:

\[
\begin{align*}
12,573,981 & \quad \text{and} \\
11,894,397
\end{align*}
\]

Think about the process that your mind goes through when trying to see the difference between the two numbers:

1. There are too many digits to deal with;
2. Looking at the size of the numbers, both are 2 digits of millions (you assessed this by effectively ignoring six out of the eight digits in each number); and
3. One is ‘12’ and one is ‘11’ millions, so the second number is smaller than the first.

You could use a calculator to find the actual difference between the two, but you would not necessarily have to do this to understand the numbers.

If we follow the basic principle of rounding to two effective digits, the numbers would have been written:

\[
\begin{align*}
12.6 \text{ millions} & \quad \text{and} \\
11.9 \text{ millions}
\end{align*}
\]

Here, over half of the original digits have been thrown away – but we can quickly see, understand and appreciate the numbers themselves and their differences. Also, effectively rounded data is more memorable: take the population data for 2001 quoted earlier; which is easier to remember – 2,903,085, 2.9 millions or just under 3 millions?

Similarly, when numbers come from percentages, for example, it is tempting to write as many digits as the calculator or spreadsheet provides. Often this is to two decimal places (and Excel has a default of two decimal places): so we could have 77.42% in one category and 22.58% in the other.

If we use the rounding principle, it would be 77% in one category and 23% in the other – allowing us to see the difference between both much more quickly. Another advantage here is that many people can easily tell the difference between numbers up to 100.
2.2 Numbers in text

The general rules are as follows:

• Numbers up to and including nine in text should be written in text - one, two etc. Larger numbers should use digits, 11, 37 etc. Similarly, this could apply to percentages, for example, one per cent, though, many prefer 1%, which distinguishes a calculated statistic from a raw number;

• Use effectively rounded numbers for up to 10,000; so use 6,200 not 6,248; and

• For numbers over 10,000 use a mixture of digits and text; 13 thousand not 13,169; similarly use 1.1 million not 1,148,982.

Often we are tempted to put all the possible digits into our text because we believe this gives us the most accurate number. It may be the most precise – but this precision implies a false accuracy. It is often misleading. With population counts, for example, it is obvious that a number given to the nearest one is precise, but it is unlikely to be accurate to that level: some will have been missed. The people who counted the 2001 Census have estimated that there is a 2% under-recording of the population: that means an extra 60 thousand people in Wales (and over a million for the UK as a whole)!
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3. Numbers in tables

3.1 Table layout

Most people believe that they can put data into a table, but few will do this effectively. Again, we have to follow some basic principles as well as take into account the basic education that we have had.

Many data tables today are prepared using computer packages. This should provide neat tables but, occasionally, this is at the expense of understanding. The following (abbreviated) tables were extracted from an international organisation’s web site:

**Table 3: Citrus prices**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>national currency/kg</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>ORANGES AND TANGERINES</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Germany (DM) Spanish navels</td>
<td>1.46</td>
<td>1.43</td>
<td>1.38</td>
<td>1.53</td>
<td>1.27</td>
</tr>
<tr>
<td>Spanish clementines</td>
<td>2.25</td>
<td>2.16</td>
<td>1.97</td>
<td>2.09</td>
<td>2.04</td>
</tr>
<tr>
<td>United States (cents) California navels</td>
<td>66.48</td>
<td>65.58</td>
<td>90.06</td>
<td>132.19</td>
<td>68.11</td>
</tr>
<tr>
<td>Japan (yen) Average</td>
<td>181.44</td>
<td>293.58</td>
<td>269.17</td>
<td>264.08</td>
<td>237.1</td>
</tr>
</tbody>
</table>

The major difference in presentation is that the numbers in Table 3 are **left justified** and those in Table 4 are **centred** in the columns. Back in primary school, in mathematics, we were carefully taught that putting numbers in columns was important. In sums we always had to observe layout under column headers: **h**, **t** and **u** - for hundreds, **tens** and **units**.

This was the way we handled numbers when we were younger, and now we need to follow the same principle again so that we can interpret the table easily.

Numbers that have more digits to its left are ‘larger’ than the others – so, if we think about how we interpret and compare numbers with many digits, it is obvious that we only look at the digits on the left of the number to start with, in order to get some basic idea of size. We also find it easier to look down a column of numbers to compare them.
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However, even in this process, we rarely consider more than the number’s first two digits! Table 3 destroys this rationalisation in two ways: firstly, the numbers are left justified, which takes away the basic visual comparison; and secondly, the last number in the table only has one digit after the decimal point. Table 4’s author has used a single button in Excel to destroy the easy comparison of the data by putting them all in the centre of the column.

These two tables are from the same part of the organisation’s web site – and both make the user work in irregular ways to try to understand what the tables are saying.

All tables in a publication should be in a similar format. We have given a sample table layout in Annex 1.

Tables should not be filled with grid-lines: a solid line is used in a table only to highlight a change in definition or practice in collecting the data.

Usually, in a long table, rows should be grouped in sets of five followed by a space line. This means that the user can quickly identify the number needed without using a ruler.

When data for a run of years is shown in the table, the years’ summary is not shown in the table title (as in Table 1). When the data is for a single year, the date is shown (as in Table 5 on page 8).

3.2 Logical ordering

When illustrating time you should follow this principle:

If you were presented with three numbers in a row:

26,300  27,400  20,500

and were then told that they represented the number of new jobs in three successive years, you would assume that the first number related to the earliest year and the last number to the latest year.

If the numbers were presented in a column:

26,300
27,400
20,500

again, you would assume that 26,300 as the first figure was the first year’s number, and the 20,500 was the latest year’s.

Why? Because we read from left to right and top to bottom.

Our minds believe that time and data run from left to right or from top to bottom. Anyone who presents data the other way round is inviting a poor understanding.

Some tables contain too much information. When showing numbers and percentages for several years, it is tempting to put all of the data into one table, using alternative columns for the two types of data. For a table with three data columns and three percentage columns, we then expect the user to compare number data in columns 1, 3 and 5 and percentage data in columns 2, 4 and 6. It is easier for the reader if two tables are created, one for the numbers and one for the percentages – and you should also consider swapping rows and columns so that the principal comparison is in a column to help the reader.

The way the rows are ordered within a table is another way to help the reader understand your message. When you use a table to illustrate a characteristic, the rows should be sorted, for example, from highest to lowest: this will help your reader to see
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the table’s message clearly. Consider a table showing the percentage of waste recycled in
five neighbouring authorities: the standard presentation would be to put the rows in
alphabetic order of the authority name; sorting the rows on the data would help to show
the highest and lowest data much more clearly and so helping in the interpretation of the
data.

When a table is presented just to show information, a natural – but user-friendly order, is
better.

For example, if the rows relate to electoral divisions, it would not make sense to mark
them 1, 2, 3, etc. Instead you should use the electoral divisions’ names. These should
be in alphabetical order – as most readers would expect this. The only real difficulty here
happens when the table is prepared bilingually – for example, with the division names in
English to the left of the table, and the names in Welsh to the right: whichever language
is sorted alphabetically, the other will be out of order. Here we would have to resort to
another logical order – which may be the divisions’ numeric order.

For tables showing local authorities’ data in Wales, an agreed order has been defined
which is based on geographical position in Wales, starting in the top left, with the Isle of
Anglesey and ending with Newport. The list’s order can be found in the latest edition of
Digest of Welsh Local Area Statistics (see Annex 2).

Another of the principles that we were taught when we were younger was where the total
of rows or columns should appear. If a sum was shown as either:

(i)  357 + 621  or

(ii)   357
    +   621

then there is no doubt as to where anyone would put the total. In example (i) it would be
to the right of the numbers; and in example (ii) it would be below the numbers.

One government department does this the opposite way and puts the column totals at
the top and the row totals to the left: everyone joining that department has had to
rethink the principles that they were taught in primary school! A quick scan of such a
table can lead easily to misinterpretation of the data.
呈报数据

3.3 比较数字

在比较数字时，将数字列成一列比横排更容易。

表 5：1995 年部分欧洲国家人口

<table>
<thead>
<tr>
<th>国家</th>
<th>人口</th>
</tr>
</thead>
<tbody>
<tr>
<td>法国</td>
<td>58,020,376</td>
</tr>
<tr>
<td>丹麦</td>
<td>5,215,732</td>
</tr>
<tr>
<td>德国</td>
<td>81,538,628</td>
</tr>
<tr>
<td>英国</td>
<td>58,491,643</td>
</tr>
<tr>
<td>卢森堡</td>
<td>406,589</td>
</tr>
<tr>
<td><strong>总计</strong></td>
<td><strong>203,672,968</strong></td>
</tr>
</tbody>
</table>

因此，如果您希望读者理解一串数字所传递的信息，可以将它们列成一列。

在表 5 中，数字列成一列有助于我们理解数据。我们的大脑在数字的左数位处看着它们并扫描：

- 您会注意到有三个国家的左数位数字相同；
- 德国的左数位是‘8’，因此它是最大的；
- 法国和英国也具有相同的左数位‘5’；
- 我们接着看右数位，因为在这里我们无法区分这两个数字；
- 我们接着看第三位，而且可以看到英国的第三位更高，‘4’。

更好的表示方法如表 6 所示。
Table 6: Population of part of Europe, 1995

<table>
<thead>
<tr>
<th>Country</th>
<th>Population (Millions)</th>
<th>Per cent of total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Germany</td>
<td>81.5</td>
<td>40.0</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>58.5</td>
<td>28.7</td>
</tr>
<tr>
<td>France</td>
<td>58.0</td>
<td>28.5</td>
</tr>
<tr>
<td>Denmark</td>
<td>5.2</td>
<td>2.6</td>
</tr>
<tr>
<td>Luxembourg</td>
<td>0.4</td>
<td>0.2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>203.7</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

- You will see that there are fewer digits in this table even counting those in the percentage column. This allows us to understand the data more quickly.
- Notice as well that re-ordering the numbers by size also helps us to understand the data.
- The descriptor line has been removed and explanations have been given below the column headings. This is because all of the data cannot be explained by just one description.
- Applying the effective rounding principle to this table, we would have rounded to whole millions and whole percentages. That would show Luxembourg as 0 millions and 0.0%. This questions the inclusion of Luxembourg in the table: if it is essential that the line for Luxembourg is shown, then we have to round differently. If it is not essential to show the row, either the data can be excluded from the table or the row excluded but the data kept in the total with an appropriate footnote.

**Principles for tables:**

1. Round data in summary tables;
2. Right justify numbers in columns;
3. Make sure that all tables in a publication are in a similar format;
4. Show time either from left to right, or top to bottom on a page;
5. Show row totals to the right, and column totals to the bottom of the table;
6. Put data to be compared in columns rather than rows;
7. Use layout to guide your reader’s eye;
8. Keep tables as simple as possible; and
9. Arrange columns and rows in natural or size order.
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4. Using charts and diagrams

4.1 How clear is the message?

‘A picture is worth a thousand words’, so the saying goes...

...And this is true, but only if the picture is a true reflection, in this case, of the data.

More often than not, particularly as we can now produce charts and diagrams almost instantly on personal computers, the wrong or inappropriate diagram is produced, which then gives the wrong message.

To present numbers effectively in charts, graphs and diagrams, you have to do several things at once:

1. ensure that the picture represents the data accurately;
2. make the diagram simple enough so that your reader can quickly understand your message; and
3. use colour appropriately to help with presenting your message.

Here we deal with presenting data in charts, diagrams and graphs that will be displayed on paper and/or on a screen (two-dimensional). We should not use three-dimensional tables/graphs, as they do not present the data clearly in a two-dimensional medium. For example:

a. House conditions – three dimensional block chart

The raw data here, is simply

Good = 1  Average = 2  Poor = 3.

The reader’s first impression is that all three bars appear to be below their scale lines – this is the third-dimension effect. Notice also that while the front and side areas of all the blocks seem to be in proportion, they all have the same top surface – so the first block appears visually to be relatively bigger. The data is represented accurately only in the blocks’ front faces – so this is all that needs to be shown.
b. Interventions in various client categories

Presenting pie charts like the one below now seems very common. But what message do they give? And is it the correct one?

**Percentage of interventions identified in each category**

<table>
<thead>
<tr>
<th>Category</th>
<th>Apparent percentage of visible area</th>
<th>Actual percentage from data</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Universally applied</td>
<td>43</td>
<td>46</td>
</tr>
<tr>
<td>2 Pre-school</td>
<td>22</td>
<td>12</td>
</tr>
<tr>
<td>3 School-aged</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>4 Adults and elderly</td>
<td>17</td>
<td>19</td>
</tr>
<tr>
<td>5 Early problems</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>6 Severe problems</td>
<td>9</td>
<td>14</td>
</tr>
</tbody>
</table>

The person who drew this diagram (yes, it was actually published!), intended to show the relativities of the various categories listed in the table above (taken from the *Actual percentage from data* column). We would expect the relative sizes to be in the right ratios. Even if we ignored the third dimension, the chart’s proportions are incorrect. So, if we take the third-dimension visual impression into account, the parts of the chart where we can see the third dimension (towards the front half of the chart) have a greater impact than those where we can’t see the third dimension (at the back half of the chart). So the data is not being represented accurately in this three-dimensional format.
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4.2 Charts – formatting principles

Most people will be more concerned with the colours that they use in charts and diagrams than how accurately the data is represented. The difficulty in interpreting charts should be as much the creator’s concern as the reader’s/interpreter’s.

A good first principle, before starting to draw a diagram, is to write an aim for it. For example:

‘I want to show the relationship between the increasing money spent on a service and the number of assessments undertaken’

or,

‘Show the relative amounts of money spent on various services in a year’

With a clear aim, it is then easy to draw a diagram and check whether the outcome meets the aim. However, without a clear aim, it is very easy to deliver the wrong message from data presented in diagrams.

In the following pages, we look at some principles which, essentially, are standard practice. Each diagram should be judged against these principles. Remember that most readers try to understand the message of any diagram without reading the scale or any other information associated with it.

Good diagrams clarify the data and are easy to read. The message should be obvious so the diagram does not need to be studied a lot. If the diagram is not clear, the reader will, more than likely, not try to understand your message.
4.3 Pie charts – formatting principles

Pie charts should be used to display the proportion of a total in relative terms. The items being displayed can be:

- related - such as people in different areas; or
- unrelated - such as the modes of travel to work.

If the items are related, the pie chart should be in different shades of one colour as shown below in the pie chart of Malawi’s Northern region populations.

If the items are unrelated, the pie chart should be in different colours. The example below shows this type of pie chart. In both cases the pie charts start at the ‘12 o’clock’ position; this helps the reader to have a reference point for interpreting the largest segment. The segments are also ordered by size, which instantly helps the user to gain information from the diagram.

You should always label the chart effectively so that you do not have to use any other references. Resist the temptation to have a segment for all the possible data splits. It is better to arrange the smaller elements into groups (if possible). You should only use up to six segments in a pie chart; so if you have more than six categories, it would be better if you displayed the data in a bar chart.
4.4 Graphs – formatting principles

Graphs are normally used to display the movement in one or more data items over time, such as the local authority’s population or the number of admissions at a leisure centre.

Sometimes a graph’s scale can be shown incorrectly, and sometimes two or more data items with different scales can be shown on the same graph to show the relationship between the two data items over time. These elements can be confusing.

Look at the two graphs below.

**Graph A**

The reader takes a very different understanding of the message from graphs A and B.

In A, the population rises steeply. In B, the population starts at a high level and increases slowly.

Which is right? The underlying population data is the same in both graphs: so, what is the difference?

In graph A the bottom of the scale does not start at zero – this exaggerates the rise in population.

Look at graph C: even if we added the scales, the graph still seems to show that the population is rising steeply – which is not true.

**Graph C**
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Graph D is the proper way to present the data, and so we may be tempted, having considered the aim of the chart, to rethink its inclusion in the report.

**Graph D**

One possible solution would be to convert the data into an index.

Take a look at graph E.

The first year of the series is equated to 100. The following years’ values are then calculated relative to this. This would allow the reader to compare the change in population across the years.

This indexed graph is also useful for comparing relative changes in two series where the values are quite different, for example the populations of Wales and England.

**Graph E**

Graph E presents the relative values and not the absolute values. So, the reader has to consider the movement of the line and not the distance from any starting point. It is also clear from this presentation that the proportionate change is indicated by the graph’s movement.
4.5 Bar charts (or block charts) – formatting principles

A bar chart shows the relationship between the data’s values in terms of the bars’ visual area. As with graphs, it is very important that the bars are correctly drawn with the scale shown – including the zero point.

An example of a chart not following this principle is shown in bar chart A below.

Using overlapping bars – which hide some of the area, also gives the wrong relative impression, and is another problem in presenting bar charts. This error is shown in bar chart B, below.

**Bar chart A**

[Insert image of bar chart A]

**Bar chart B**

[Insert image of bar chart B]

In bar chart A, the first bar represents ‘40’. The second bar represents ‘20’. So, the first bar is meant to be a factor of two larger than the first. But, the visual difference shows that the first bar seems five times larger than the second. Remember that the reader often concentrates on the actual diagram not the peripheral items such as the scale and title/footnotes.
In bar chart B, Mzimba’s bold colour and the way the bars overlap give the visual impression that Mzimba’s bar is much larger than Mzuzu’s.

For simple bar charts: **Always show the full scale. Do not overlap the bars.**

If you want to show more than one data set, particularly where the second data set requires a different scale - it is important to think through the full reasoning of the chart’s aim. Ask the questions: Is the message still clear? Do the different scales add confusion?

In bar chart C, we must ask whether the main comparison is within the counties or within the modes of travel to work.

If the main comparison is within the modes of travel to work, then the bar chart should be as in bar chart D.

**Bar chart C**

![Bar chart C](image)

**Bar chart D**

![Bar chart D](image)
Presenting Data

4.6 Pictograms – formatting principles

Pictograms were invented to present statistics to non-statisticians so that the data could be easily related to the subject. This could be cars, people or, as in the example below, money.

These charts are usually prepared in a similar way to bar charts, but pictures replace the bars. The quick picture is another way of presenting your data. The idea is to show a particular item's growth, but instead of replicating the picture, (as in Pictogram A), the second picture, (in Pictogram B), is double the height and double the width (which is the equivalent of four times the area). So instead of the ratio of the pictures being 1:2, it is 1:4, and so Pictogram B is incorrect.

<table>
<thead>
<tr>
<th>Pictogram A</th>
<th>Pictogram B</th>
</tr>
</thead>
<tbody>
<tr>
<td>£1 million</td>
<td>£2 millions</td>
</tr>
<tr>
<td>£1 million</td>
<td>£2 millions</td>
</tr>
</tbody>
</table>

Pictogram C below shows the more common form of pictogram. Here, the bars are replaced with lines of pictures, with the last picture being cut appropriately. This type of diagram can help to get the message across to specific interest groups, particularly children. The reader may find the actual values difficult to interpret depending on which picture you choose, although using vertical grid lines in the chart can help.

Pictogram C

Percentage with cars

- Karonga
- Chipita
- Mzimba
- Mzuzu
Principles for diagrams (charts and graphs):

1. Never use three dimensions;
2. Do not overlap bars in bar charts (this distorts the visual comparison);
3. Use colour sparingly: shades of a single colour are often more effective; bold colours may draw attention away from the main purpose;
4. Always put the zero point on the scales when graphing absolute numbers or preparing standard bar charts;
5. Order the pie chart’s segments largest to smallest. Start the first slice at either the 12 o’clock or 3 o’clock position. Do not separate any segments from the centre as this will complicate interpretation;
6. Always label the diagrams effectively;
7. Always show gridlines to help interpretation;
8. Always use appropriate rounding of numbers on the axes;
9. When using pictograms, the basic pictograms should be of the same size but, obviously could be cut vertically just to show a part of the pictogram. These can only be used to represent data on a single scale; and
10. Create statistically correct charts.
5. Using maps

5.1 Basic map principles

Maps can be an effective way of displaying and conveying information that would be very difficult to understand if it was put into a table. It is tempting to use as many different colours as possible. This loses one of the main purposes of communicating the information which is the relative position on a scale of the various areas. Each comparison on the map forces the reader back to reading the scale to see whether red is ‘better’ than green or pale blue. Map 1 below, illustrates this.

Map 1
A slightly better example comes from the work on the Welsh Index of Multiple Deprivation (WIMD). Here, information on almost a thousand data items can be displayed and understood quite quickly. Map 2 below, however, does not follow some of the basic principles.

**Map 2 - Welsh Index of Multiple Deprivation 2008 Housing Deprivation Domain**

The first thing to note is that most people will try to interpret a diagram or map without reading the notes or the scale. If we apply this principle to Map 2, it is quite clear that there is some sort of scale for those areas coloured blue.

We could then make a further assumption that the deeper the colour, the larger the ‘value’. As the non-blue areas (green and yellow) are coloured in two separate colours, you could assume that the data is unconnected with the blue coloured areas. If we were to examine the scale more closely, we can see that there is a range: with yellow indicating the lowest value; moving up to green; then palest blue through to darkest blue. It would have been far more useful if the whole map had been in shades of the same colour.

If you coloured the ‘lowest’ value area in white, the immediate impression that you would give is that there is no data for that area – even if it is shown on the scale.

The only really valid time where we would advise you to use two colours in statistical presentation on a map, is where the data is trying to display two very different parts of a scale. Migration would be a good example: where inward migration could be coloured in shades of blue and outward migration could be in shades of red.

However, even these two colours could imply or infer a different meaning: blue being positive and red being negative. Some may then choose to use red for inward migration as they consider this to be undesirable. This makes it easier to understand the variable’s scale across the map – without having to continually refer to the scale.
Map 3 shows how a properly constructed map can help interpretation – and save a thousand words!

**Principles for maps:**

1. When using maps to display statistics, generally only use shades of a single colour to represent the strength of the values: deeper colours for higher values. The exception would be where the positive and negative values are to be shown on the same map: here use one colour for the positive values and another for negative values; the deeper shades should be at the extremes of the scale;

2. Don’t allow the map’s message to be lost;

3. Don’t use white for any of the areas – except to represent missing data;

4. Use a maximum of five shades of a colour;

5. Remember some colours imply/suggest certain characteristics; e.g. blue = water, green = forestry;

6. As with diagrams – always write an aim and check whether the resulting map meets the aim;

7. You can include data such as populations’ dots, the size of which is proportional to the value; and

8. Don’t add bar charts or pie charts to maps.
6. Further reading


## Annex 1: Standard table layout

### Table number: Table title (a)

<table>
<thead>
<tr>
<th>Row descriptor</th>
<th>Column heading 1</th>
<th>Column heading 2</th>
<th>Column heading 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Row heading 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Row heading 2 (b)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Row heading 3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Row heading 4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Row heading 5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Row heading 6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Local Government Data Unit ~ Wales

(a) Footnote 1.
(b) Footnote 2.

### Notes:

1. The column headings are centred;

2. Use lower case letters in brackets when making additional, explanatory comments in a footnote, e.g. (a), (b) etc;

3. Only one footnote should appear against the title – merge if necessary. The footnotes are then in order across the column headings (left to right) if needed and then down the row headings;

4. Footnotes should not appear against individual figures: add them to most appropriate row or column heading;

5. The table descriptor is only shown if all of the data items in the table are in the same units: otherwise add a descriptor, in brackets, to each column or row heading as appropriate;

6. When giving a total’s breakdown within the rows of a table, use indents to show the relationship to the heading, the sub-heading having a colon following it. For example:

### Type of vehicle passing inspection:

- Car
- Van
- Truck
- Articulated vehicle
- Total
Annex 2: Standard ordering bilingual list for Welsh local authorities

Ynys Môn      Isle of Anglesey
Gwynedd       Gwynedd
Conwy         Conwy
Sir Ddinbych  Denbighshire
Sir y Fflint   Flintshire
Wrecsam       Wrexham
Powys         Powys
Ceredigion    Ceredigion
Sir Benfro    Pembrokeshire
Sir Gaerfyrrddin Carmarthenshire
Abertawe      Swansea
Castell-nedd Port Talbot Neath Port Talbot
Pen-y-Bont ar Ogwr Bridgend
Bro Morgannwg The Vale of Glamorgan
Caerdydd       Cardiff
Rhondda Cynon Taf Rhondda Cynon Taf
Merthyr Tudful  Merthyr Tydfil
Caerffili       Caerphilly
Blaenau Gwent  Blaenau Gwent
Torfaen        Torfaen
Sir Fynwy      Monmouthshire
Casnewydd      Newport
Cymru          Wales