Dashboard Best Practice Guide

BY JOHNATHAN BRIGGS

DASHBOARD BEST PRACTICE GUIDE

Welcome, I've put together this 12 chapter guide on how to produce management reports and Dashboards. This pulls information from knowledge and experience at helping many varying types and sizes of business to produce management information that **makes a difference**.

The main focus of this guide is on presentation and communication of Key Performance Indicators (KPIs). I hope you find it useful. - Johnathan Briggs

ABOUT JOHNATHAN BRIGGS

Johnathan started his first business when he was just 21 years old. A decade later Johnathan had grown the business to a multi-million pound operation with blue chip clients across the world and a reputation for excellence. Key to the growth of the company was Johnathan's focus on management reporting, KPIs and constant improvement.

Following the acquisition of his first business by a UK based, public listed company Johnathan became a sort after and accomplished business mentor helping companies not only in Scotland but across the globe. His business experience and passion for improvement, innovation and excellence have ensured that he is always in demand.

Johnathan is now CEO of the leading online Management Dashboard company "Target Dashboard". He states, "Managing business, people and processes has always been a big challenge, and is often the difference between success and failure. Target Dashboard is a concept I just love, an online dashboard app that is so simple that managers can use it and be up and running in minutes".

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1. Well Chosen KPIs = Better Business Decisions!

Chapter 1

"Management Reports Best Practice"

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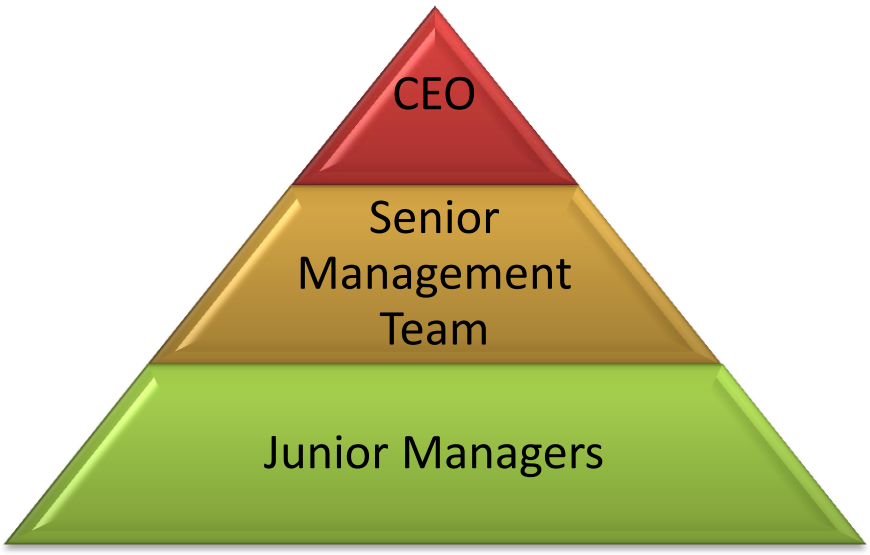
I regularly see 100's of Key Performance Indicators, that aren't really KPIs; they are just 'measures for measure's sake' or low level management data. The purpose of your KPI is to communicate a situation to a particular person, but almost every manager forgets this and focuses on what they are measuring. In this chapter we are going to look at the principle of what you should measure, why and how.

Firstly, let's consider a typical company structure. Normally this is a pyramid.



Depending on the size of the business it may have more or less layers than outlined in this diagram.

The Ideal Information Flow

Now let's consider the information flow in an 'ideal' business. Typically this starts at the bottom with our lower tier managers reviewing detailed information on a day to day basis from their staff but with higher level managers seeing simply an overview.

Let's imagine one of our operational managers monitors our production. A delay in our production here (say down to staff sickness) is something she would want to know about. If she can see we are behind schedule then she can do something about it by moving other members of staff in to lend a hand and get the order out on time.

Whilst this is a KPI for the lower Tier manager, this is certainly not a KPI higher up the management pyramid. This manager's job is to manage this issue; it's not an upper management issue.

When producing your KPIs you need to 'tier' them. One manager's critical Key performance Indicator is too much detail for another manager.

Key Point: Consider your audience. Your management reports should be tiered in a pyramid structure to match your management structure. Detail should be removed as you move up that structure to avoid information overload and a failure to take responsibility at the lower level.

Ideally you will have a small number of KPIs for each manager to review. Companies often produce too many KPIs, and often managers end up producing statistics without a clear idea of why they are doing this.

Know the "Message"

Consider that a KPI's job is to tell you one of these three things;

1. Things are OK
2. Things are looking bad
3. Things are looking good

For a KPI to be useful a manager must know what to do in each of these scenarios. Most likely "1" would mean do nothing, but "2" must have an action associated to it or it misses the point of the performance indicator. Equally "3" may well have an action such as "expand with more staff".

Key Point: A KPI is only useful if you consider the actions you might take when it tells you something good or bad. What is the message the KPI must communicate?

KPIs almost always have dates.

This may seem an obvious point, but almost every KPI should have a date associated with it and as a result operate on a fixed period, i.e. daily, weekly, monthly, quarterly or yearly.

We often see people who forget this. For example, I once saw "Average production time" for a particular job, but this was all the jobs the company had ever done i.e. an "all time" average in one figure e.g. "2.35days". On the report there was only this one figure and no previous value was shown. This was a KPI for the company. Considering one of our earlier points, what actions would this trigger? Well in this case it would rely on the memory of the reader of this KPI, so if he/she remembers that the value last month as lower he/she might take action. – Bad approach.

Better is to calculate the average for all jobs in a particular full month, so calculate the average for all jobs in the month of January and save this figure. Then we do

the same every month after that. Before long, instead of one single figure we have a list of figures and now the trend becomes very obvious and our management become a lot easier.

Key Point: A KPI almost always is periodic i.e. daily, weekly, monthly, quarterly or yearly.

Management Data V KPIs

It's easy to mix up management data with KPIs. KPIs are to be reviewed and shared, but management data is normally just for a specific manager to analyse and manipulate. For example a "support desk case" is profiled with information about what type of case it is, say a "printer problem". The database of every support desk case can be very useful to analyse and review from time to time. Excel is great for doing this, and you can often find out some interesting facts and review your processes accordingly. However this is not a KPI but is analysis of management data. A KPI is something we measure periodically and compare, so we might produce a monthly summary of the quantity of each "Support desk case Types", for example:

Jan-12	*printer problems*	*12*
Jan-12	*software problem*	*5*
Jan-12	*training issue*	*23*
…..		
Feb-12	*printer problems*	*8*
Feb-12	*software problem*	*10*
Feb-12	*training issue*	*20*

This is a standard KPI that we can plot monthly and watch say if "training issue" increases so we can review and improve our training programmes.

Accounts systems produce management data. Normally there will be people in your business expert at manipulating accounting reports with the specialist accounting software. This is best done here, but from this we can get some regular summarised KPIs and use this data elsewhere such as in management reports or dashboards, for example, "Total Amount invoiced this month".

Four Types of KPIs

Each KPI you have will likely be one of the following types. Each of these types has good and bad ways to chart and display them which we will discuss later.

Quantitative KPIs

These are KPIs with a very specific number and where knowing this number is critical, for example, "Number of sales" [per month].

Directional KPIs

With many KPIs the number is much less important than the direction of travel. For example, "Number of days lost to staff sickness" [per month]. Here the exact number of days is not that useful as we can't control this, however if the trend is rising we can investigate and take action accordingly.

Actionable KPIs

Most often these have a target / budget associated with them and action will happen if we fall above or below this budget figure. For example, if we have a "department costs" and we also have a budget figure every month then should we exceed this figure then it's likely to raise some actions or discussion.

Distribution / Category KPIs

Often you want to see the split of various categories. For example, "What type of support case types are you receiving?" A shift towards "general help" could indicate a problem with your training.

Key Point: It's important to understand which type of KPI you need. Remember, one KPI could fit more than one category. Depending on the type of KPI, the way in which we communicate it on management reports and dashboards can be very different to ensure that the message is clear.

2. Dashboard Design

Chapter 2

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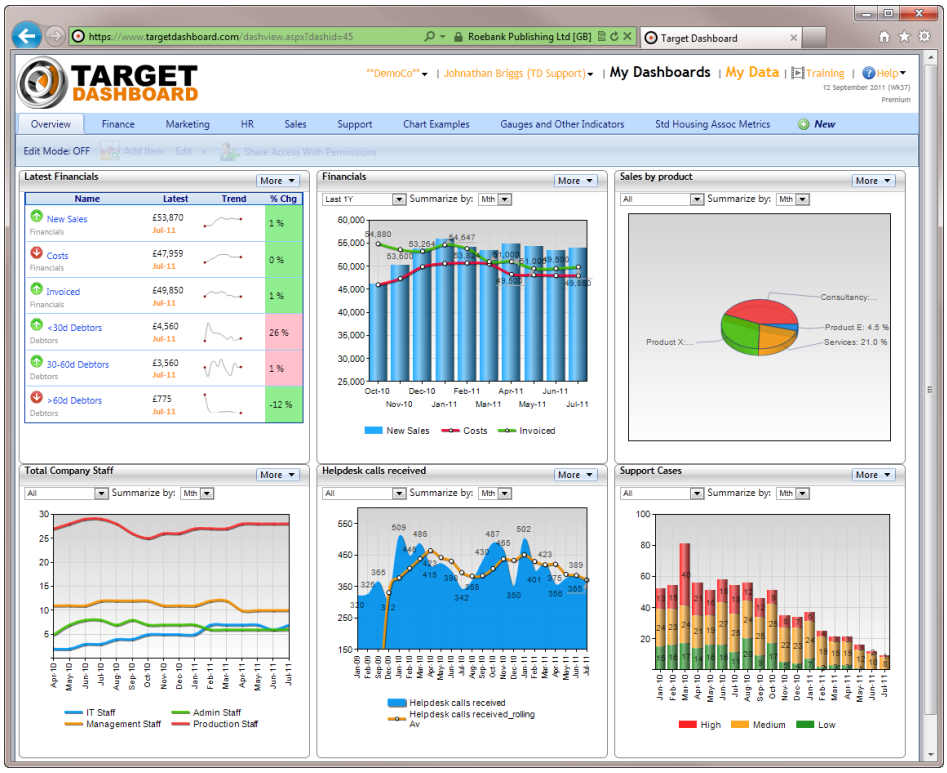
There are dashboards that you just can't help but to admire the total beauty of their graphics; surely your boss will love you if you show him a shimmering, shiny black dashboard with gorgeous animated charts. If that's what you are looking for then hire a great graphic designer. Our focus is on building dashboards that manage businesses and organisations and, whilst we like to look good, a dashboard that fails to communicate the key messages is a waste of money and effort.

With modern dashboard software it's really easy to place 100's of KPIs on a single view, but this creates clutter and allows you to take your eye off the ball. We want to track "Key" performance indicators, not "every" indicator we can think of.

Try to build a selection of dashboards with overview and detail views, so that managers can quickly review high level information and then look deeper only if they wish.



Key Point: Don't try to put too many KPIs on one Dashboard.

Understanding the Purpose of Dashboards.

You will be amazed how often managers start to build dashboards without considering what their purpose or objective is.

Dashboards are there simply for the following purposes:

- **To make comparisons**

- **See trends over time**
- **See distribution**
- **See relationships between parts of our process / organisation**

Dashboards by management Layer

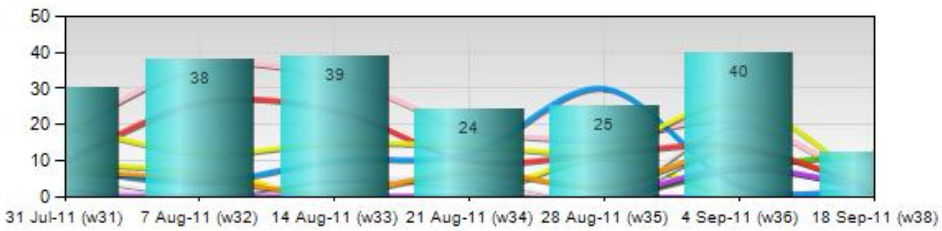
Remembering the pyramid structure of a typical management team, you should normally model this structure in dashboards. However, sharing your dashboards across the management team can be extremely beneficial for the management of a company.

Typically organisational data becomes trapped in its respective department. But consider this, if the operations department was aware of an increase in advertising spend by the marketing team then they could proactively have plans for the extra work load. This can only occur if dashboards are shared across departments allowing managers to see the relationships between interdepartmental data.

Key Point: Sharing Dashboards across different departments can help forecasting.

One table of data – one chart – No!

Most people will prepare a table of KPIs running month on month and will then prepare a single chart with which to display the results. Whilst sometimes this is OK, very often this doesn't communicate information as clearly as we could. It's tempting to show too many line charts on a single axis but the result can be confusing. Equally too much detail over too long a time period can result in key trends being missed.



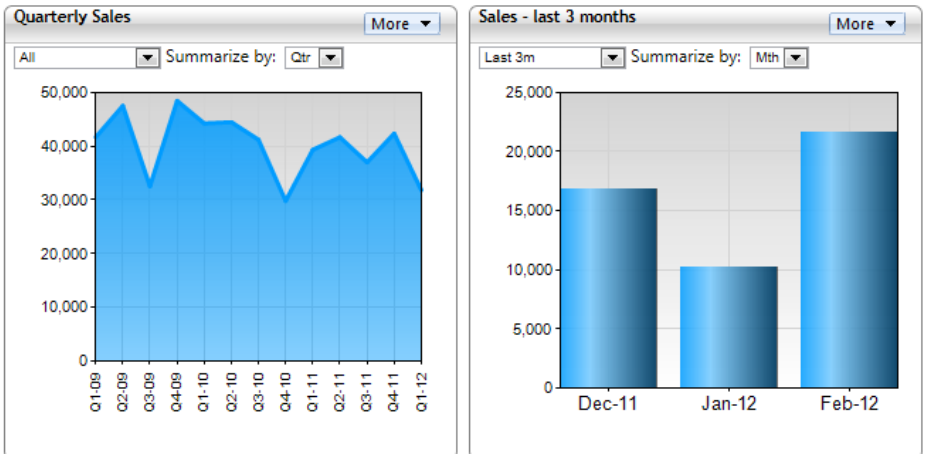
This chart is too complex to make sense from, better to split it into several charts

Tips

- Create 2 or 3 charts from the same data, or even an entire dashboard. Each chart has a different viewpoint or comparison to communicate.

- If you want a chart with "everything" showing on the same axis for exact comparison, consider duplicating this chart several more times, but with the duplicates showing just show one KPI at a time.
- Create two charts in your dashboard, a longer range chart say over the last two years, but with the detail removed (as if you had zoomed out). Remove the detail by grouping by quarters instead of months or by adding a rolling average. Then immediately alongside show a high detail chart but for a much shorter time frame, say the last 2 months. This way we can see the bigger picture over

the long term, but also get the immediate and recent data at the maximum resolution.



Low detail, long time range chart, next to a high detail short range chart

Key Point: You can, and probably should, create more than one chart per table of data if need be create more dashboards with less items on them.

PHYSICAL LAYOUT

There are no hard or fast rules about how to layout your dashboards. It's very easy to lay out charts and other visual indicators in a grid or columns but sometimes this does not allow enough room to view your performance values over a longer time period.

Depending on your data you may want to choose a layout that allows some charts to be displayed with more width. As a general rule the more width a "time based chart" has the better, but a "category chart" such as a Pie chart generally only needs a square and will be wasteful of our space if put into a larger width rectangle.

The left hand dashboard is based on a grid, the right hand had wider areas for viewing a longer time range.

As a general rule you are better to avoid too much scrolling. It's better to create new dashboards than have too much information on one dashboard resulting in clutter and potentially information overload.

3. Dashboard Visual Indicators

Chapter 3

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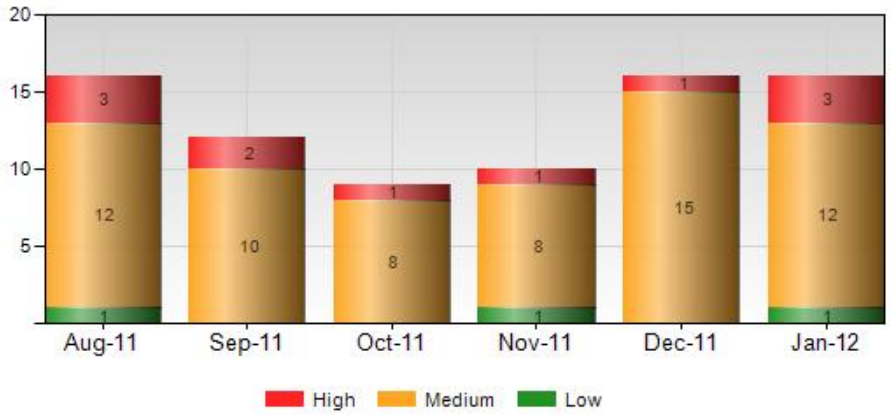
"What type of visual indicators should I put on my dashboards" is a question that I am very often asked. Before answering this question it is important to understand the following:

- What is the KPI and how important is it?
- What is the message, good or bad you are trying to communicate visually?
- Does it have a target, budget or threshold value?
- Do we want to measure specific values from the Indicator, do we want to review trends or see distribution across some categories?
- Do we want to make any comparison to other data?

When considering what type of indicator to use you must also consider the space available to you within your dashboard. Some indicators can be wasteful of space and others can have so much information in a small space that it's easy for the reader to be overwhelmed.

Time Charts

Time based charts are the foundation of most dashboards. They allow us to spot trends, measure values and make comparisons. The time chart is by far the most effective commination tool for the size that it takes up on your dashboard.



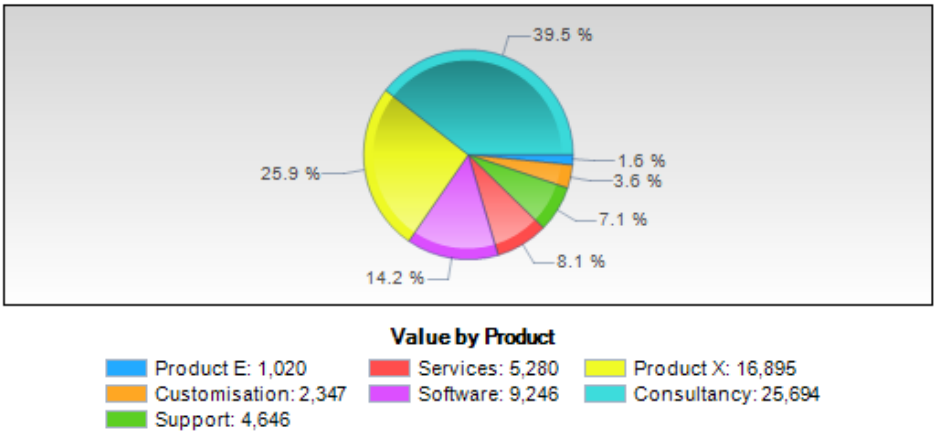
There are so many styles and layouts of time charts that you can normally represent any data in an easy to read way.

Key Point: Time charts are totally essential to any dashboard.

Category Charts

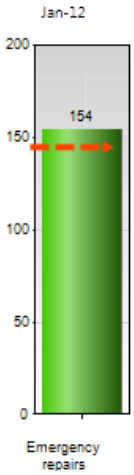
Category charts take on many guises, but are more often represented as Pie Charts. They display the distribution of various categories across a specific time frame.

Category charts look great, but should not be overused as they do not show historical or trend information. A category chart is great to compliment an existing time chart using the same data but displaying a distribution breakdown.



Gauges and Dials

Gauges are a long-time favourite of the marketing manager of Dashboard applications. They look glossy and great and present the current situation to a reader. They work best when combined with a target value, for example, showing a real-time display of a call centre's "number of calls waiting" but in my view they offer a poor method of communication to the reader.



The big problem with a gauge is that it takes up a lot of space and does not tell us anything about the past. So take the example on the right hand gauge above. Is

"154 Emergency Repairs" [done on time] good or bad? It's above the target….. but what if….

- 3 months ago performance had been awful, but since new changes came into place month on month performance has improved to the current level.

Or,

- For the last 3 months performance has been getting worse and worse, viewing the trend would suggest that next month we would fall well below target.

Can you see how a gauge fails to communicate these two situations (one good one bad)? The point of a dashboard or management report is so that we can foresee problems and deal with them before they become a big issue. With a gauge the chances are that you will not see the trend and your customers will be telling you that your performance is poor well before your gauge turns red.

Gauges are not a favourite indicator or mine. I believe a time chart in the same square inches of space is a far superior management communication tool.

Spark Lines and Trend Indicators

A spark line or trend indicator is a clever way to put numerical information into some context. They are small and compact and can easily be included in tabular and numeric data. Their purpose is simply to "indicate" the trend and in my view they are a welcome addition to dashboards.

Score Cards or Progress Tables

If you would like to get a lot of information into a small space then developing a scorecard is a good bet. The score card can combine both numerical and graphical information in a very compact display. This is great for an overview or a dashboard that you want to display the "big picture".

Name	Latest	Trend	% Chg	Tgt	% Tgt
Costs Financials	£47,959 Jan-12		0 %		
Invoiced Financials	£53,651 Jan-12		5 %	£50,000	7 %
<30d Debtors Debtors	£3,369 Oct-11		46 %		
30-60d Debtors Debtors	£3,540 Oct-11		-21 %		
>60d Debtors Debtors	£870 Oct-11		-28 %		

What you put on a scorecard depends on how you would like to use the data, but typically you might have:

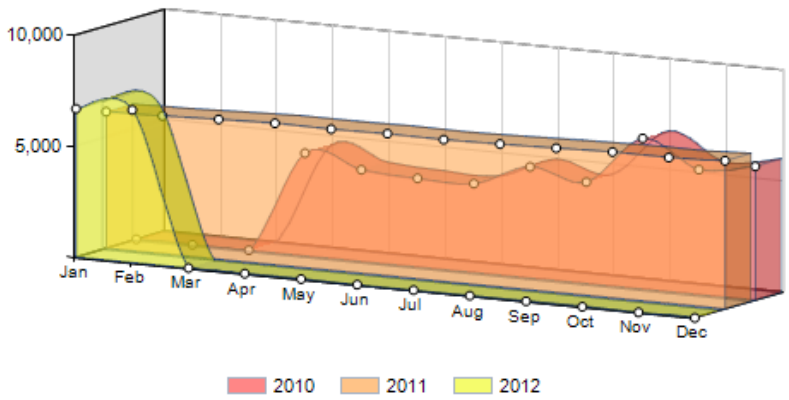
- Current values

- Previous values for comparison
- Percentage change up or down
- Target
- Percentage on or off Target

The addition of spark lines can also really help place the figures in context.

Comparison Charts

If your KPIs are best compared to the same period one or two years ago then a comparison chart is the best approach here. It provides good clear communication of the comparison as long as you don't add too many years.



Raw Data

Often forgotten in visual dashboards is the raw data. Sometimes it helps communicate the message if the numbers are combined with the visualisations, so you should consider short tabular summaries.

Monthly	Spend (£)	Leads Generated
Feb-12	6,873	40
Jan-12	6,675	40
Dec-11	6,675	39
Nov-11	6,573	40
Oct-11	6,573	35

Take care not to put too much data on a dashboard. Reading large tables of data can be not so easy on a screen, so keep it summarised and short.

4. Choosing the Right Chart

Chapter 4

"Management Reports Best Practice"

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Which Chart, Gauge or Indicator do you use on your dashboard or reports?

Dashboards must communicate a message, so before choosing charts and indicators for your Dashboard you should consider this:

"What is the message and action that this KPI should communicate?"

Also, remember you don't need just one all fulfilling chart. Try using several different charts on the same dashboard to present different messages from the same data.

Key Point: Before picking the chart, think about the Message your KPI is trying to communicate.

If you read the first article in this series you will have seen that KPIs are best divided into the following types.

Quantitative KPIs

These are KPIs with a very specific number and where knowing this number is critical. For example, "Number of sales" [per month].

Directional KPIs

With many KPIs the number is much less important than the direction of travel. For example, "Number of days lost to staff sickness" [per month]. Here the exact number of days is not that useful as we can't control this, however if the trend is rising we can take action accordingly.

Actionable KPIs

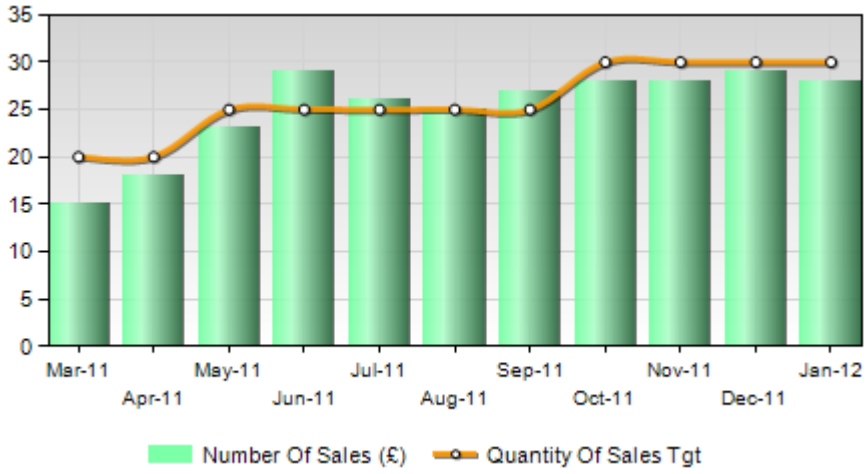
Most often these have a target/ budget associated with them and action will happen if we fall above or below this budget figure. For example, if we have a "department costs" and we also have a budget figure every month then should we exceed this figure then it's likely to raise some actions or discussion.

Distribution / Category KPIs

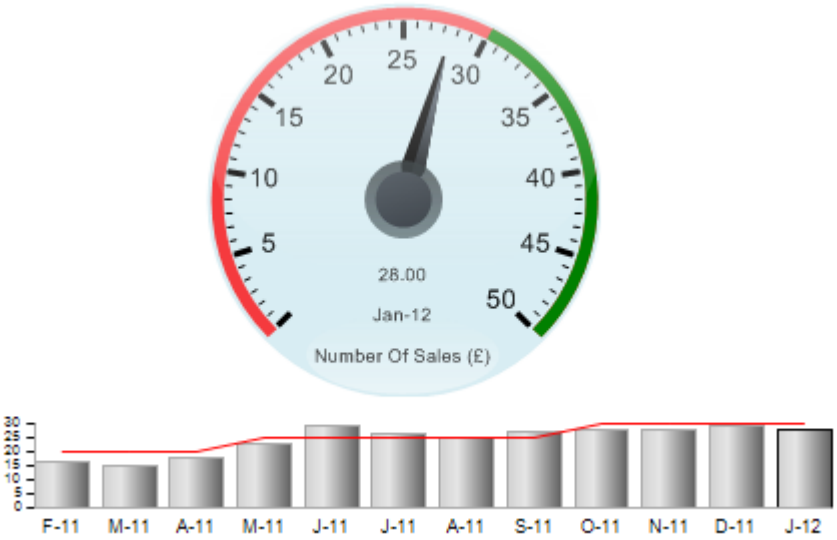
Often you want to see the split of various categories. For example, "What type of support case types are you receiving?" A shift towards "general help" could indicate a problem with your training.

Each of these types requires a different type of chart to communicate their message and we will consider this in more depth later. But by way of example, here are three charts, each ideal for the four types of KPI.

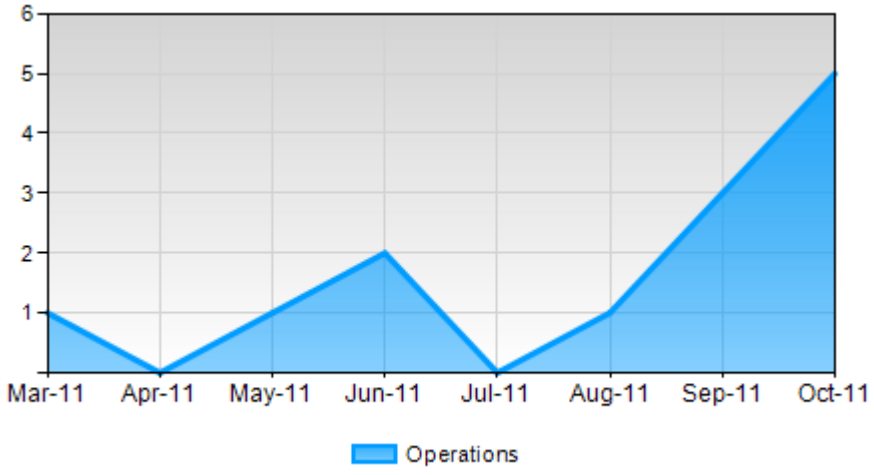
Quantitative – a column chart showing 'Number of Sales' and the associated target.



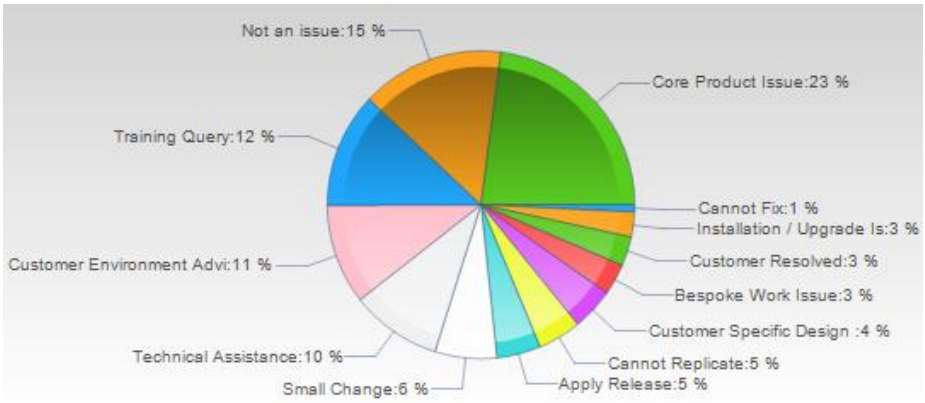
Actionable - a gauge showing 'Number of Sales' and the associated target.



Directional – an area chart showing the "Number of days lost to staff sickness" [per month].



Distribution – a pie chart showing "What type of support case types are you receiving?"



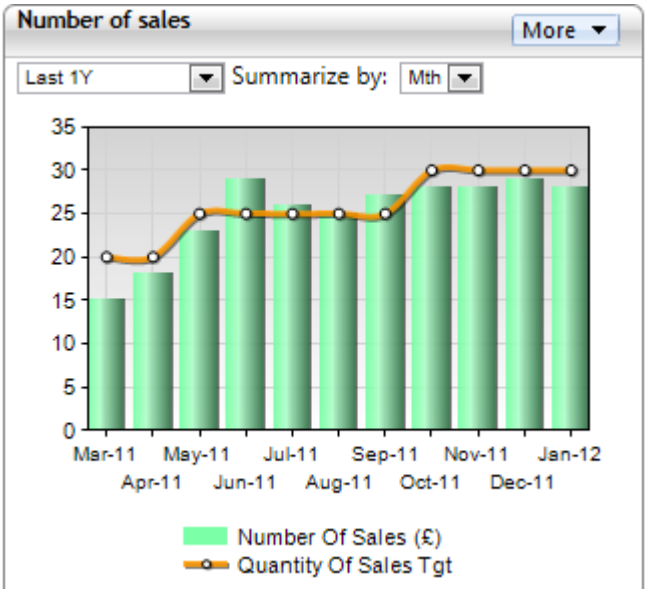
CHARTS OR GAUGES

Pictures of glossy gauges sell dashboard software and provide the illusion that everything is going great. However whilst not discounting the use of gauges I am far from being a big fan of them.

Consider a speedo style gauge showing a current month's value and a target. If we reach the target then the gauge shows green, red if we have failed to meet the target.

The problem is that this gauge shows us a snapshot in time. It tells us nothing about historical performance – just the current situation.

If instead you use a chart with a target line, not only can this give us today's situation but we can also see it in the context of our historical data.



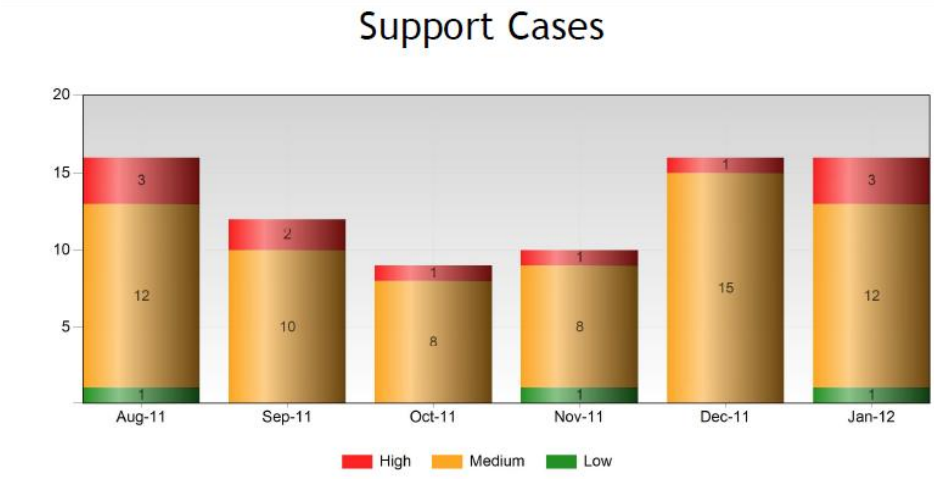
We might have missed the target this month by a tiny amount, so a gauge rings alarm bells, but what if over the last 3 months performance was steadily improving month on month making it look like it should smash the target next month – surely this is good news not bad news?

For the same space in a dashboard, and for the same time required by a manager to review a gauge a chart communicates the same and much, much more information. It does not look as shiny and cool as a gauge, but you have a choice of pretty or profitable.

Numbers and Comparisons

A picture tells a thousand words, so visual indicators are very powerful. But don't forget your audience will be a mix of people who like to see both the visual and the numbers.

Don't forget to make some of the numbers available in your dashboard alongside your other indicators.



Monthly	High	Medium	Low	Total New Cases	Total Closed cases	Total Open Cases
Jan-12	3	12	1	16	9	18
Dec-11	1	15	0	14	10	19
Nov-11	1	8	1	12	13	18
Oct-11	1	8	0	14	12	16
Sep-11	2	10	0	15	20	14
Aug-11	3	12	1	23	25	19

One way of doing this is by adding value labels to your charts but another is to add the latest few months' data as a table or to create a scorecard style comparison.

A scorecard is a loose term for many different layouts of numerical data. However I think that any scorecard ideally should show this current month's KPI value, Last month's, and % change and, if appropriate, the relationship our current month has to its target. Depending on your data you may also want to make comparisons to the same period (month) the previous year so that you can make a performance comparison.

Key Point: The chart type and style depends on the type of KPI you have and the message you want to communicate. Don't be afraid to represent the same KPI in different chart types to communicate several messages.

In the few chapters we are going to look in depth at the pros and cons of the various chart types.

5. Time and Category Charts

Chapter 5

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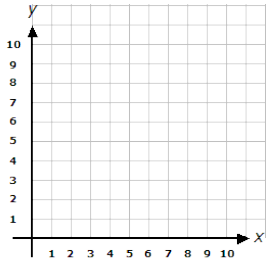
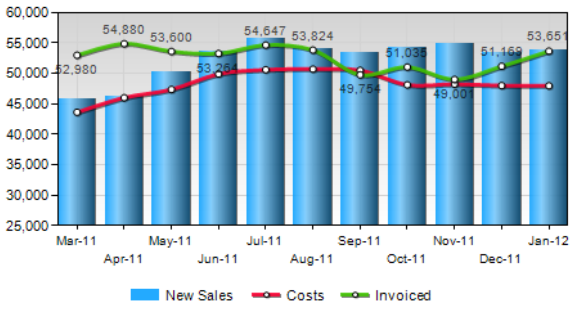
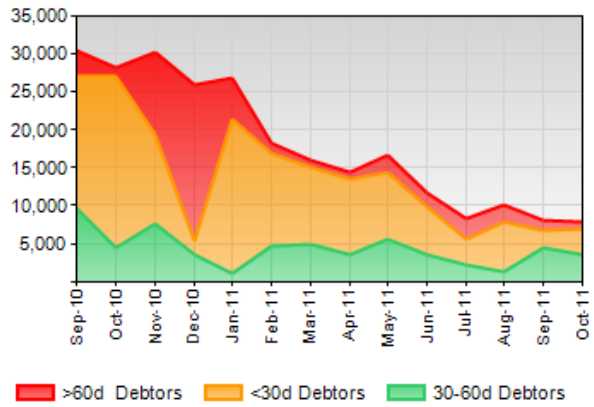
Charts have two axes, "X" & "Y" but these can be used in two different ways.



One simple but fundamental concept is that for KPIs there are normally two different chart types, "Time Charts" and "Category / Distribution Charts".

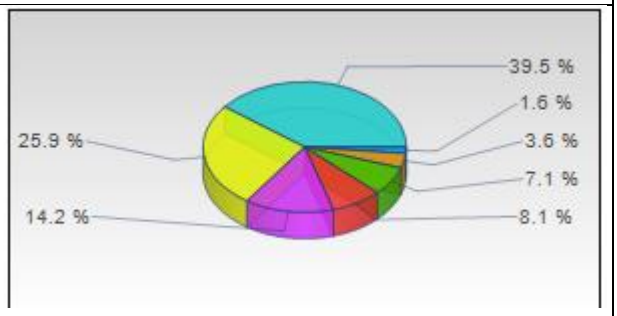
Time Charts

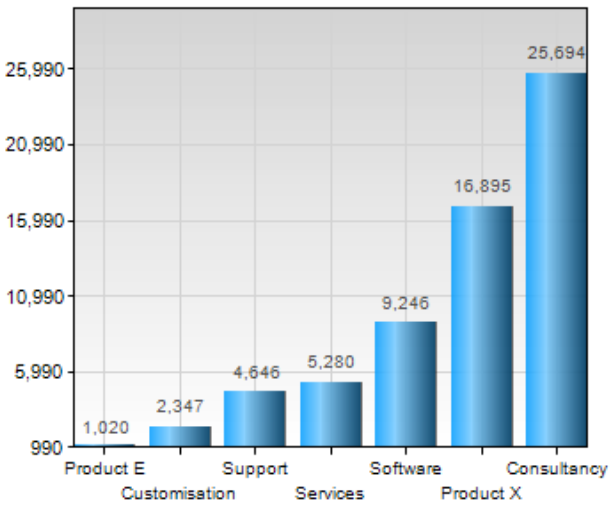




Time charts always have "Time" on the x axis. This type of chart shows values change over time.

Category / Distribution Charts



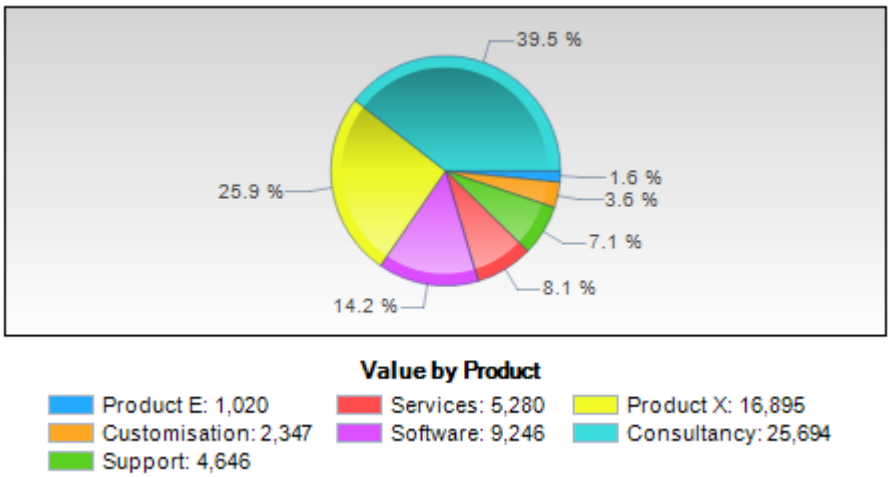


Category charts are most often seen as Pie charts, but could also be a number of other chart types including a column chart. Unlike a time chart, time is not shown on the chart, instead it is broken down by categories within a specified time period.

The best way to see these two chart styles is like this:

- Time charts: Show Trends
- Category Charts: Show Distribution

Most managers see lots of time charts on a week to week basis and they are easy to read. However category charts can often be a little misunderstood, so I'll just spend a minute considering a pie chart.



This category chart is a 3D Pie chart however it could any type of category chart. Look carefully at this chart, what does it tell us?

Actually the answer is very little although it does look nice.

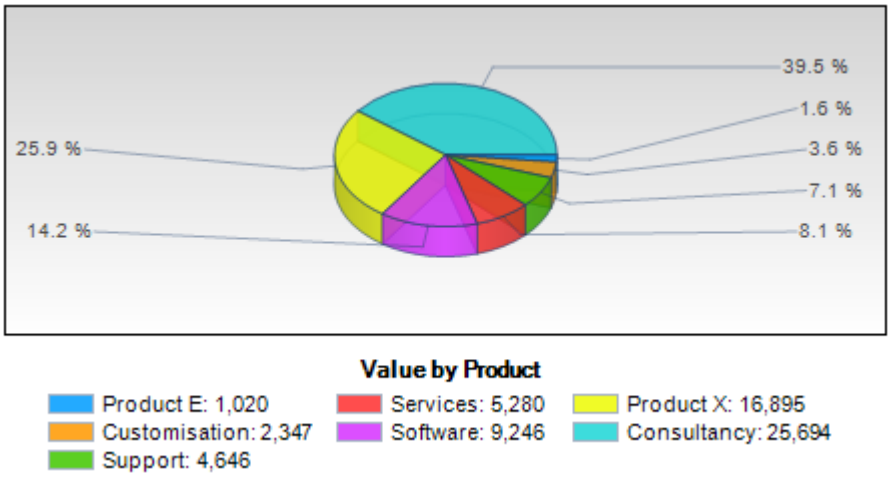
The pie chart is broken down by categories, but for what time period? Here it's not clear so as a communication of a KPI this is near useless.

If this chart had been titled "Product Sales from Q1" it now becomes more meaningful.

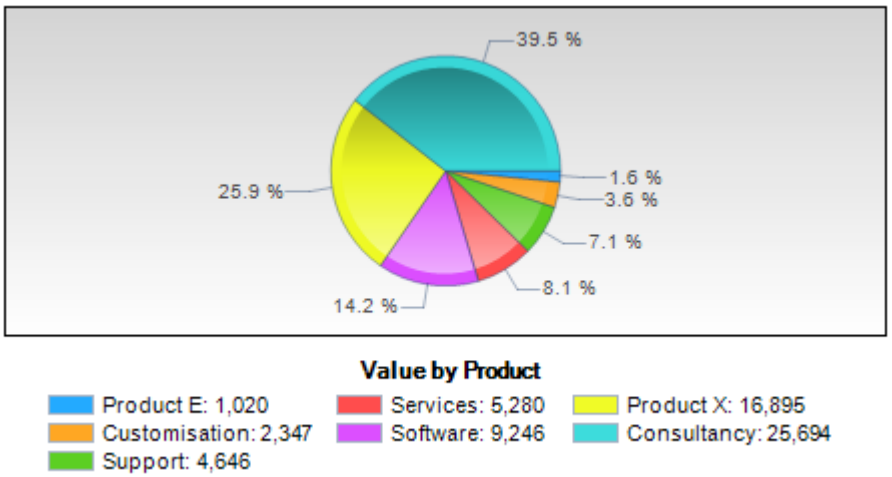
Key Point: All category charts must have a **date range** and this must be communicated to the user.

2D OR 3D

I love 3D charts, they look great and never fail to impress the casual viewer. However if you really care about the numbers, 3D charts are very difficult to read, so adding values or annotations is essential. Have a look at the examples below.



In the example above 3D can make it awkward to read values. On the pie chart below the values are much clearer.



I like the occasional use of 3D charts, if it helps the presentation. Sometimes round pie charts with annotations do not fit that well in dashboards and making them 3d will fit more neatly. However, making this type of chart into a 3D version can, when viewed on a dashboard, distort the perspective of the chart and cause the wrong value to stand out.

Key Point: There are two fundamental chart types, "Time charts" that show values over time and "Category charts" that show distribution of value across several categories.

6. MEASUREMENT CHARTS

Chapter 6

"Management Reports Best Practice"

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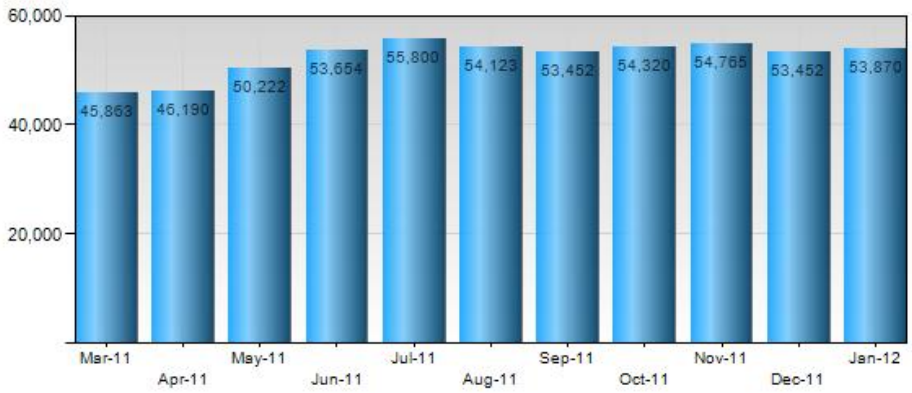
Depending on your KPI it might be very important to see the exact values plotted on a chart. Some charts are better at this than others.

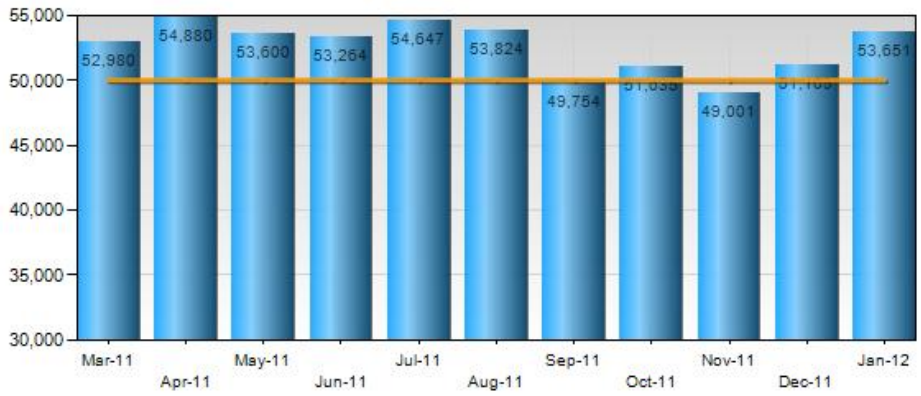
The golden rule with most charts trying to communicate values is not to try to put too much on the same chart. This could mean too large a date range or too many KPIs.

By far the best chart is the humble column chart.

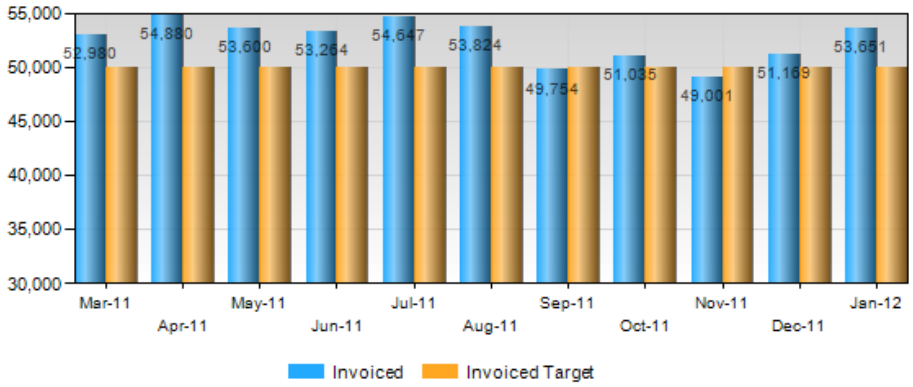


Key point: Match the chart's volume of data to the amount of space you have available. Do not over clutter the chart.

The chart can be easily improved with a target or budget line and by changing the y axis minimum from in this case 0 to 30,000.

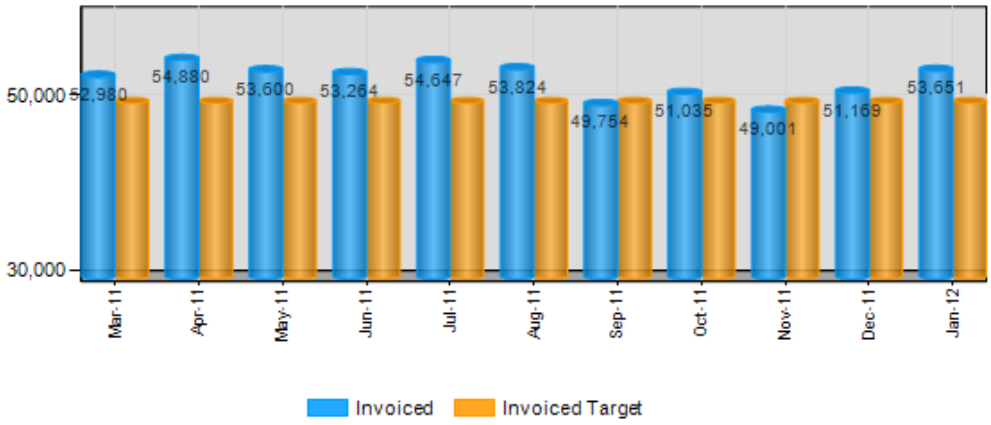


Side by side columns normally only work if you have 3 or 4 columns only, otherwise they become not so good: This chart is more cluttered and harder to read than using a target line



This chart shows the same information as the previous chart but is harder to read

3D is generally a bad idea here and makes a chart even more unreadable.

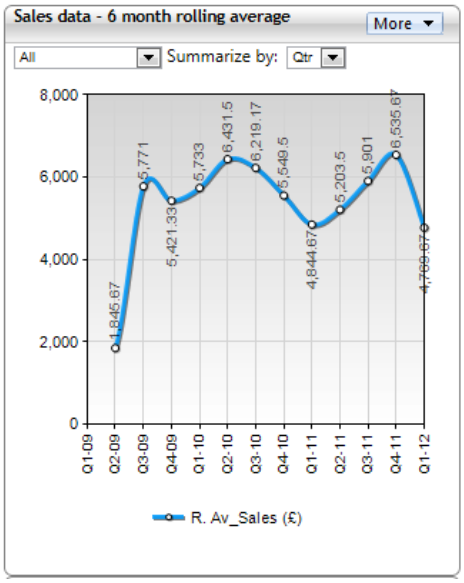


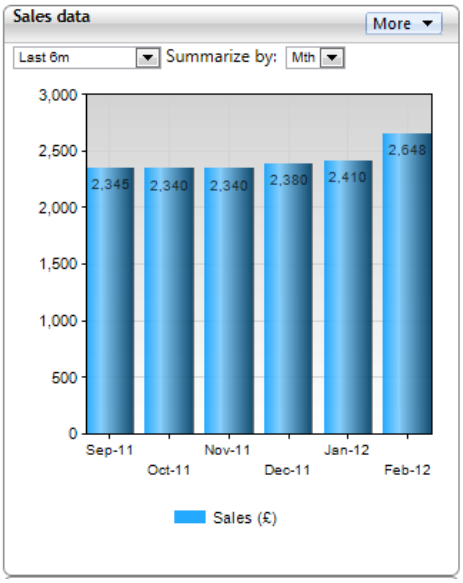
There are many types of charts for measuring values, but the column chart is normally the most familiar and the best.

You may find that you can also combine this type of chart with other line charts so for instance adding a rolling average line as an indication of trend.

Side by Side Charts

Sometimes we want to see both recent values and also view the data in the context of historical data. In this case you should consider charting the data twice. For example you could show a "rolling 6 month" chart with accurate, easy to read values then show the data over the period of the last 2 years so the trends and content are more obvious.





Measurement Chart Tips

- It hard to beat the humble column chart
- Try to show value labels on our chart
- Do not try to plot two much data
- Avoid 3d as it makes values hard to read from the scale
- Consider two of more charts of you want to plot a longer time range

7. TREND CHARTS

Chapter 7

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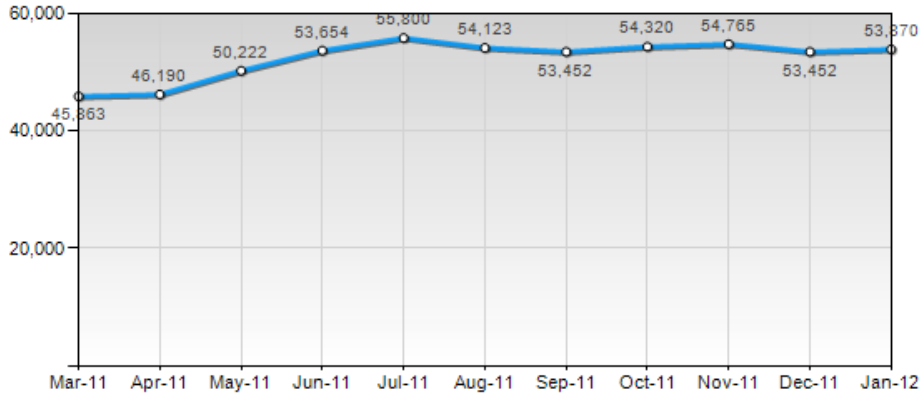
The most powerful use of time charts is to spot trends. If, as managers, we spot a trend, we can take action before the situation becomes critical and our business will run smoothly. Depending on your KPI type the most important thing might be to illustrate the trend, i.e. the direction of travel rather than the exact current KPI values.

Before building any chart ask yourself,

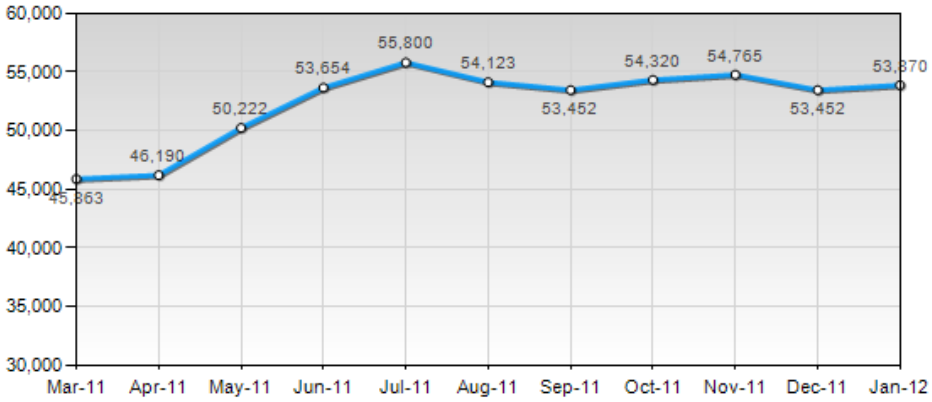
"What is the message?" What is this chart going to communicate?

Trends take many forms, but let's start simply.



This line chart is plotted every month. If you have the space and the chart is not over cluttered, always try to include the values to help the reader have a sense of perspective.

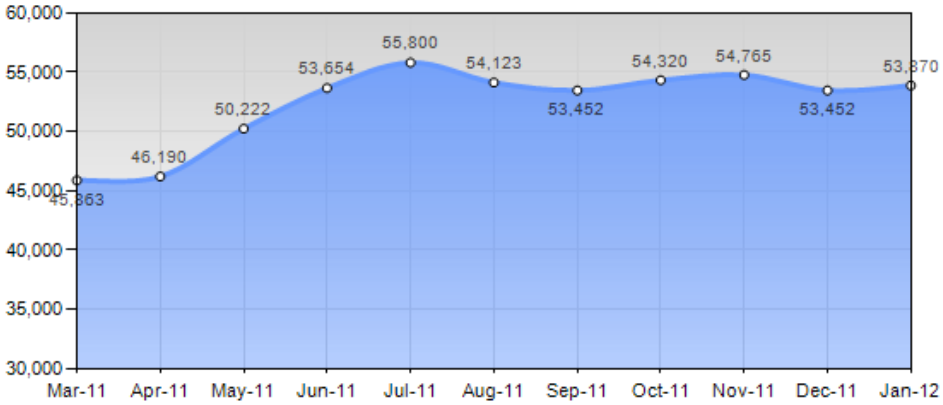
Most of the space on this chart is unused, so we can make the trend more obvious by changing the minimum value of the Y axis from 0 to say 30,000.



Now our trend is amplified but is still 100% accurate.

Key point: Changing the Y Axis minimum can make the trend more obvious

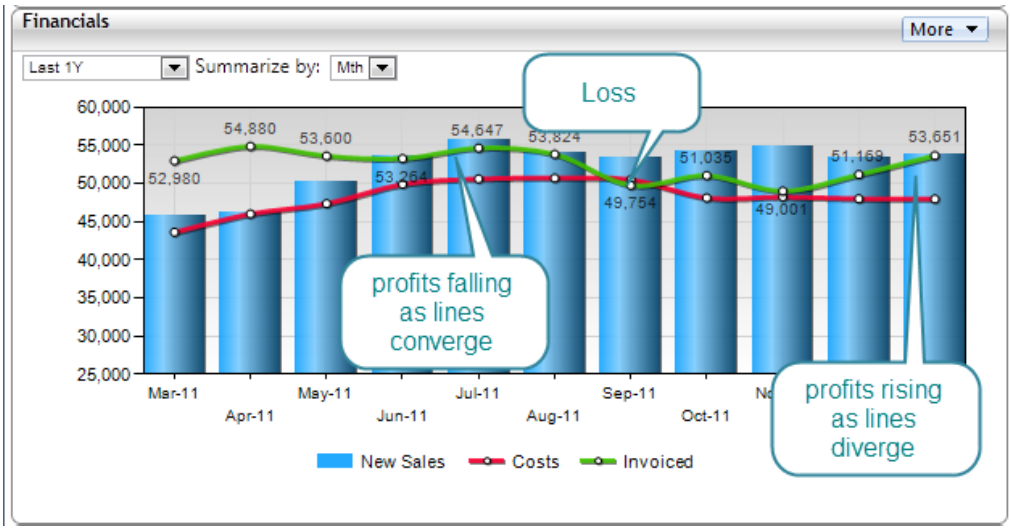
Whilst this line chart is 'OK' we can make it visually clearer by making this a filled area chart instead of just a line. Visually, a filled area chart is much easier on which to spot a trend than on a line chart because the volume of block colour is easier to read at a glance.



Key point: Filled Area charts are easier to read KPIs from than line charts.

The down side of filled area charts is that they can become difficult to read if you want to plot more than one KPI on the same chart. This is useful when the data has a relationship.

Combining Chart Styles



In this simple example "Costs" are plotted as a red line and the "Invoiced" as the green line.

As a rough guide this company's monthly profits are "Invoiced" – "Costs".

So this chart is very powerful, as the approximate profit is the space between the green and red line.

Again think about the message. Here we're trying to communicate a future problem of profitability and deal with it before it happens.

You can see that in April-11 the costs and invoice line begins to converge - bad news, this must be addressed. Let's say that once seeing this the management team address this issue, and take some actions that initially cost more money, but will help productivity.

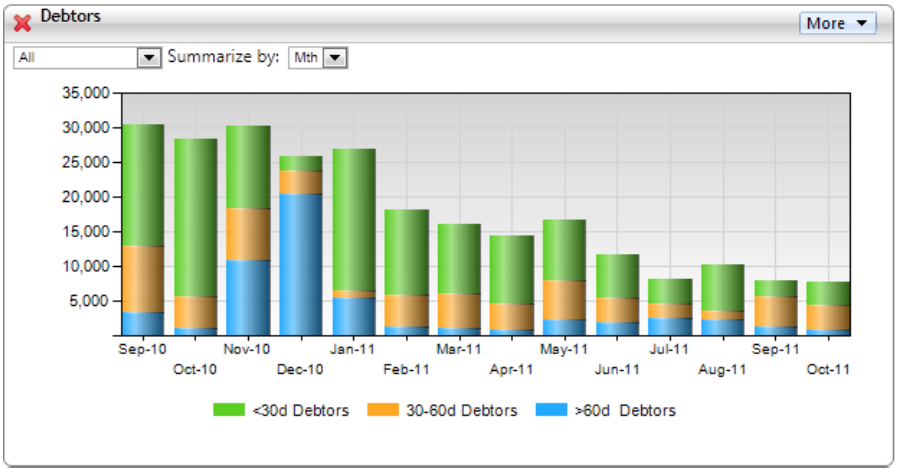
As a result the company briefly make a loss in Sept-11 but not only returns to profit after this but also as the green and red line diverge the profit margin begins to increase which is great news!

You might ask why we didn't just plot the "profit" on a simple line or area chart to see the trend. The answer is that this chart communicates more. Note that the costs remain almost constant during the entire period and that it is the falling invoice value that is the main reason for our profit problems. This chart illustrates these two trends.

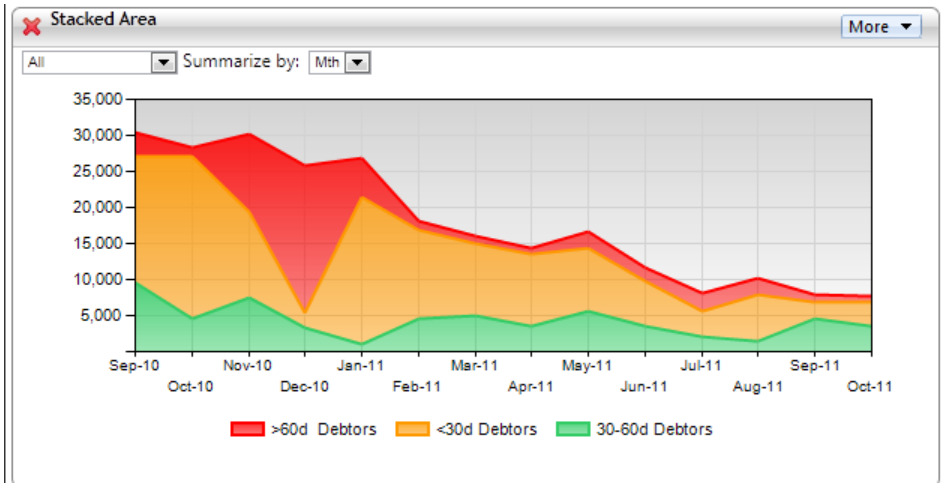
Trend Distribution

Often it's useful to know the trends of distribution. For example if we sell 3 products it's good to know how over time the numbers are shared out.

More often than not, a manager will use the Stack column chart. This is a very useful chart and shows us the total and distribution simultaneously.



Whilst this is a useful chart, there is a better and little used way to represent this this data in a much clearer way. Using the Stacked area chart we can more clearly see the distribution of trend over time.



Just like a stacked column chart the values are stacked on top of each other, but in this case it is much, much easier to observe how things change over time.

Trends Chart Tips

- Change the Y Axis minimum from 0 for values are always at a higher level
- 'Filled Area' charts are easier to read than line charts
- Multiple series of data plotted on bar charts often looks cluttered
- Combine different chart styles keeping emphasis on one key KPI as a bar chart, but showing targets or other information as less emphasised lines.
- Stacked Areas charts are often better for showing distribution over time than stacked column charts.

8. How to Reveal Trends

Chapter 8

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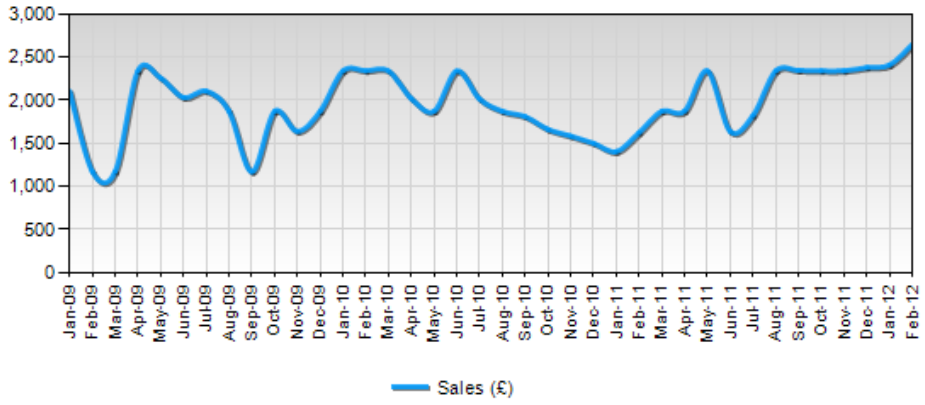
For a company that sells 1000's of widgets per month they could track their sales easily on a chart and the trend would be quite obvious. But consider a company that sells two or three big deals every month. Tracking their sales and seeing a visible trend is much more awkward. They might sell 5 projects in January and just 1 in February so any chart would look like a roller-coaster.

Managers often find it hard to interpret the good or bad news in such figures. Whilst a best fit line could be added to a chart, I personally am not a big fan because you don't control the mathematical formula behind that line so as a result you don't really know what's it's telling you.

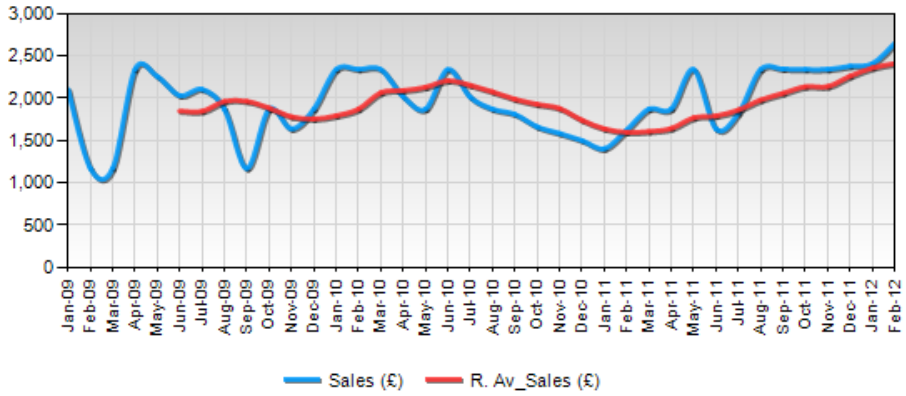


The solution to this is easy.

Smoothing with a Rolling Average

Either simply chart your monthly data by quarter, so your data is effectively smoothed out. But the down side of this is that you have to wait a whole three months to see a change in your reports.

Or, much better, use a "rolling average", often called a "moving average". This is where we take the latest *n* (say 3) values and average them to produce a value. In Excel this can be a little complex, but tools like Target Dashboard make this possible with just a single click.



Above – a 6 month rolling average chart

Depending on your data you can increase the damping (smoothness) by increasing the number of months that you run your rolling average over. Using this technique your trend now becomes more obvious and it's easier to take action on what you see.

Key Point: For KPIs where volumes of data are low or fluctuate a lot, consider using a rolling average to make the trend more obvious.

9. Comparison Charts

Chapter 9

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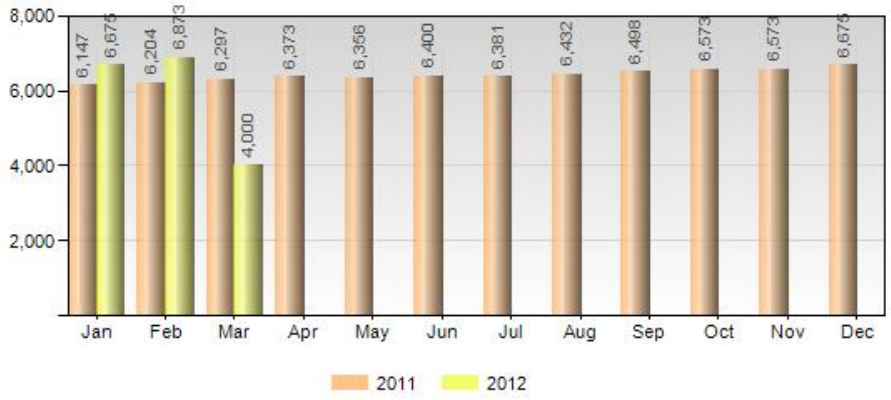
Comparison charts allow you to compare a value to its equivalent value at another period in time. For example if our business was seasonal then we might want to compare Dec-11 sales figures with the previous year Dec-10.

Depending on the message behind your KPI, a reader may want to measure values from your chart or simply make a visual comparison. Understanding which of these requirements is the most important will determine what style of chart you use.

Charting Measureable Values

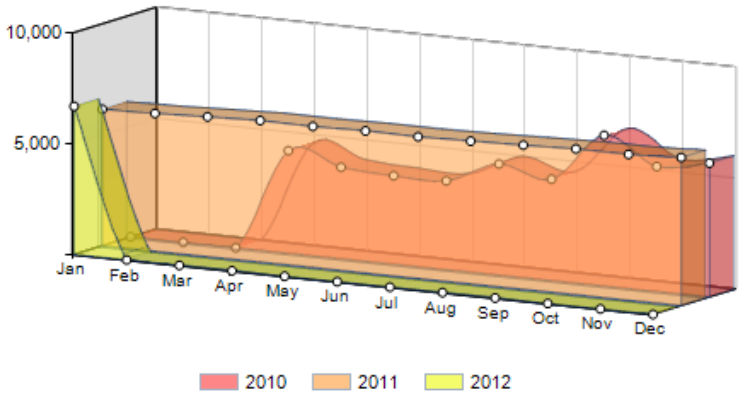
If you need to see directly measurable values on your chart, then the best solution is to use a column chart with a column for every year. This can soon become cluttered, so you are normally best limiting this to a two year range.



Charting For Comparison Purposes

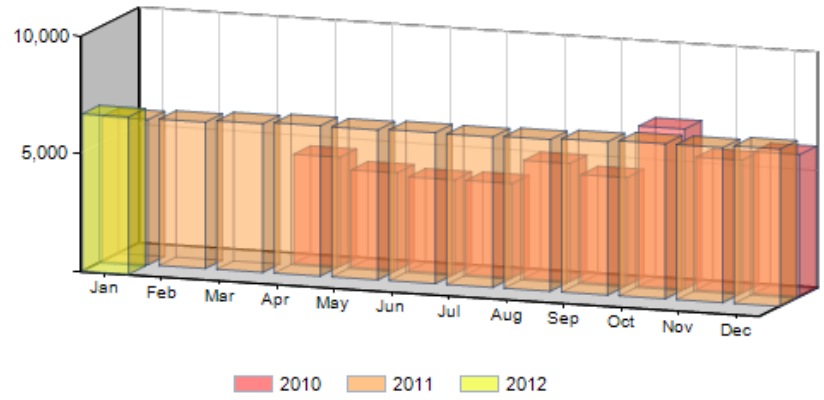
For the majority of uses caparison charts are used just to gauge performance against a previous year. In this instance being able to read the exact numbers is less important when compared to seeing the visual comparison.

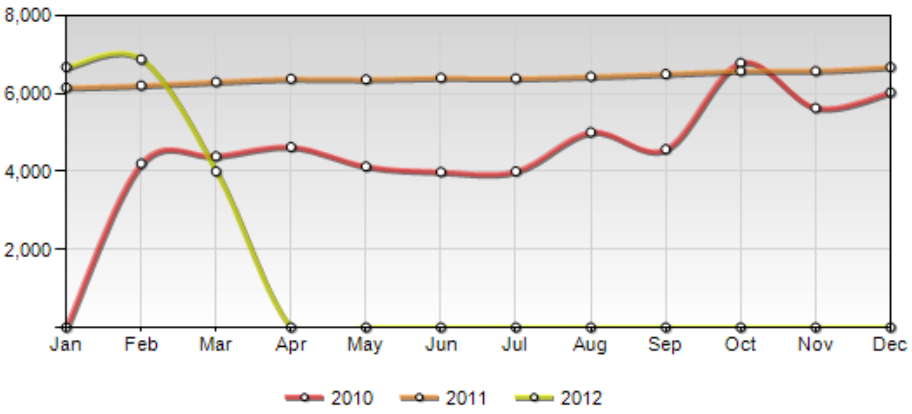
3D charts don't just look good here but are actually better allowing us to see the more data than we would have otherwise.

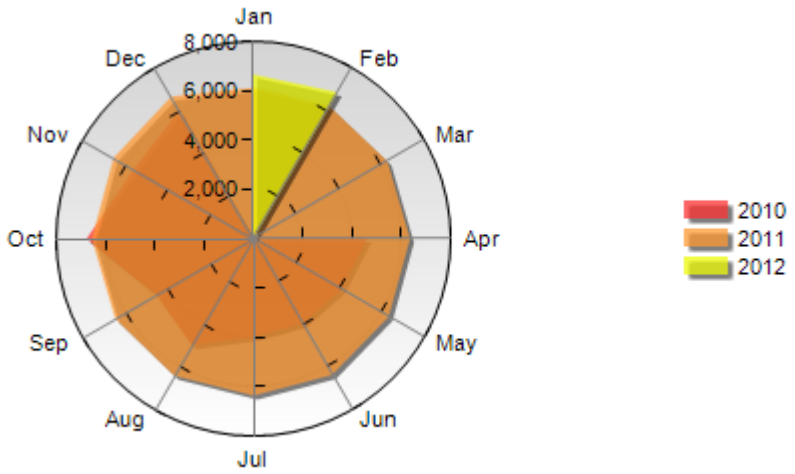


Comparison Charts Styles

It's hard to specify a preference in comparison charts, and I find it very much depends on the type of data you have. If your data is increasing year on year then one style will be more readable than another. Here are some examples:







Comparison Chart Tips

- The more years you choose to show the harder the chart is to read
- Pick a chart that most suits your data. Rising or falling data often is clearer on different chart styles
- 3D charts can help you to see the multiple years more clearly

10. Distribution / Category Charts

Chapter 10

"Management Reports Best Practice"

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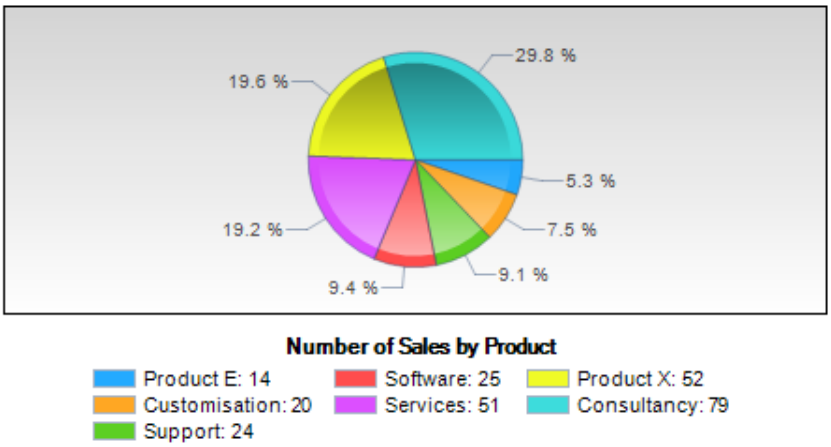
If you have a Distribution / Category KPI where values are broken down across different categories, then you are going to need a Category Chart to visually communicate the current situation.

Category charts are designed to communicate the split of various categories. The most popular of this type a Pie chart.



Category charts are normally of limited use in a dashboard because they only show the current situation and don't show any history. Pie charts look great on a Dashboard and this often leads to them being over used at the expense of communication.

Key point: Pie charts only show the current situation and do not show trends. Don't over use category charts; sometimes a time based trend chart communicates much more in the same space.

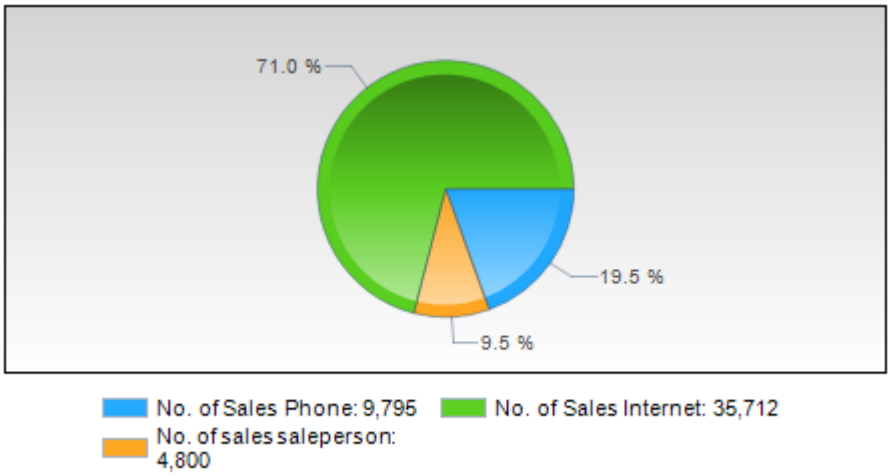
Unlike a time based chart which would likely show a "time", say months, on the x axis, a category chart has no moving time scale. Instead a category chart is a snapshot of time across a date range. So, for example, you might have a pie chart showing product sales by category for the date range "this year to date".

Key point: Category chart must have a date range e.g. "Last Quarter".

Overcoming the Limitations of Pie Charts

Consider a real world situation where we use a pie chart to display the quantity of sales in our key product categories. As the report designer our first job would be to say "what is the message here". Well commercially I'd suggest that we would want to see if one product's sales were growing at the expense of another product. This

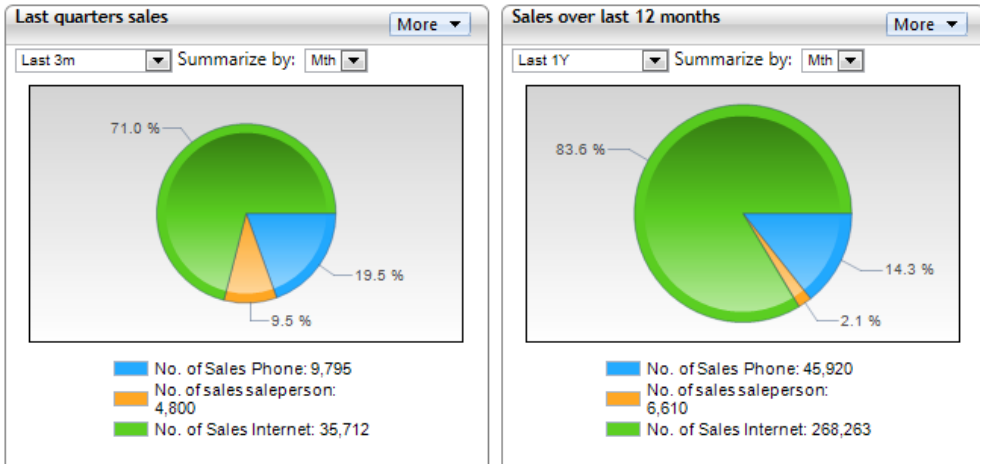
might be because more marketing had been done or a product was reaching its end-of-line.



So we could show a pie chart of last quarter's sales, but again this is limiting because it only shows the current situation and the reader must rely on their memory to decide if what they are seeing is good or bad.

One simple trick to overcome the inability to view historical data is to display not just one pie chart, but two side by side.

So in our example we can create our pie chart for "Last Quarters Sales" but alongside it show a duplicate of this chart, but across a different date range. For example "Rolling last 12 months". So now we have two pie charts from which we can directly compare, effectively showing the current split to a 1 year average.



Two pie charts, each with a different date range

Where do Categories come from in your data?

You can only produce a Category chart if your data allows this, i.e. you must have some categories stored in either rows or columns.

Generally there are two approaches to your data here.

1. **Categories come from column names**

Month	JB Sales	AH Sales	FB Sales	Total sales
Oct-11	6	8	9	23
Sep-11	5	5	7	17
Aug-11	4	4	5	13

In this data layout each category is a column of data. This data layout is good if you have a small number of categories. If you have 10's of categories then the data can become difficult to manage. Note: each month has one row.

2. **Categories are stored in their own column.**

Month	Product	Value (£)	Number of Sales
Jul-11	Software	4,123	10
Jul-11	Consultancy	5,673	10
Jul-11	Support	2,301	11
Jul-11	Customisation	1,023	12
Jun-11	Customisation	1,324	8
Jun-11	Support	2,345	13
Jun-11	Consultancy	3,456	12
Jun-11	Software	5,123	15
May-11	Product X	13,245	12
May-11	Consultancy	12,345	12

If your data comes from a database this is more typical of what you might have. Note that here are many rows for every month. Here we have a column that contains text of each category type. This format is more complex to handle but allows us to pivot data and track a category over time.

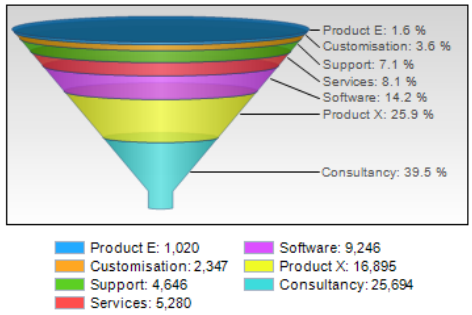
Key Point: Categorised data can have two formats. If you have a small number of fixed categories it's often easier to manage data using a column for every category. If you have lots of categories, more complex reporting requirements or your data comes straight from a database then the second option of creating a 'category' column is best.

Chart Layout Tips

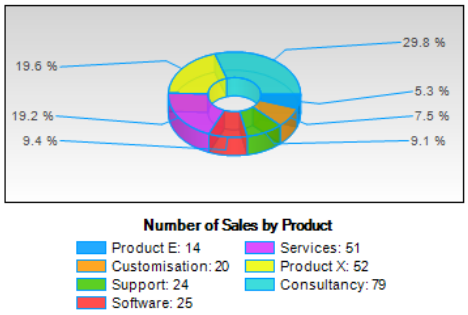
Below are some different examples of category charts, however here I am going to focus on a pie chart.

- Try to include labels and call outs to make the chart easier to read.
- Don't have too many segments in your chart. 10 segments below 3% in size will be unreadable. Set a threshold and add anything below say 5% to an "other" slice.
- Sometimes % are useful, sometimes the raw values or interactive charts with hovers can be useful here.
- Put two charts with different data ranges side by side for comparison.
- 3D pie charts look great but really distort he numbers and can lead to incorrect reading of the chart.

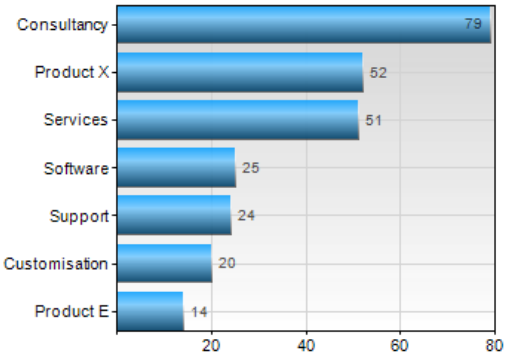
OTHER EXAMPLES OF CATEGORY CHARTS



Funnel Chart



Doughnut Chart



Horizontal Bar Chart

11. Don't Forget The Data

Chapter 11

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It's easy to become focused on graphical visualisations for all of your numbers, but sometimes it's worth also showing the numerical values.

Consider you Audience

I personally love charts and anything visual, however I know lots of people who prefer to see numerical data. Every person has a preferred method of communication so it's important that any management reporting information that we put in places bears this in mind.

With most of this series we have looked at visualisations of data, however in this chapter we care going to look at presentation of numbers. It's important to note that this is often to complement our visualisation and not necessarily a replacement for them.

Displaying raw data

Within a dashboard or paper based management report you may want to display the raw data. It's very easy for this to become overwhelmingly large and therefore hard to interpret so I would recommend that you limit it to perhaps the latest values or perhaps just the last few months so your table has only 6-7 rows and is a numerical complement to an existing chart.

Monthly	Spend (£)	Leads Generated
Feb-12	6,873	40
Jan-12	6,675	40
Dec-11	6,675	39
Nov-11	6,573	40
Oct-11	6,573	35

"Score Cards"

There seem to be loads of definitions of what a scorecard actually is. Personally I believe the definition is totally irrelevant. In my view a Scorecard is a graphical and numerical presentation of data that you can use on a periodic basis to evaluate your KPIs. Exactly how that is presented depends on the KPI, the message you want to indicate and what works best for your organisation.

Title	Dec-11	Jan-12	% Change	% on Target	YTD	Trend
New Sales	£53,452	£53,870	1 %	n/a	£53,870	
Costs	£47,989	£47,959	0 %	n/a	£47,959	
Invoiced	£51,169 Tgt:£50,000	£53,651 Tgt:£50,000	5 %	7 %	£53,651	

Above is a simple example used by a company and this works very well to convey a lot of information in a small space. We can see trends, targets, traffic style colour

indicators as well year to date (YTD) information. Percentage changed or percentage over or above target can be useful as well as very motivational.

Key Point: Scorecards can be a consistent and powerful way to report KPIs, but adjust the design and layout of your scorecard to suit your information.

Presenting Data Tips

- Consider showing more numerical information in paper based reports.
- Don't show too much numerical information in electronic dashboards as it's more difficult to read.
- Develop your own scorecards as a consistent method of presentation.

12. Paper and Electronic Reports

Chapter 12

"Management Reports Best Practice"

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In this online electronic world it's often tempting to push all our information online; after all this means we don't need to worry about distribution, geography or what type of computer, tablet or phone our reader has. However, no matter good an online dashboard is, you can't write notes on it before your management meeting and you can't wave it around in your hand!

In my view online Dashboards are the future, but I don't feel they are ever going to replace the humble paper based report.

A paper based report is NOT a printout of your dashboard

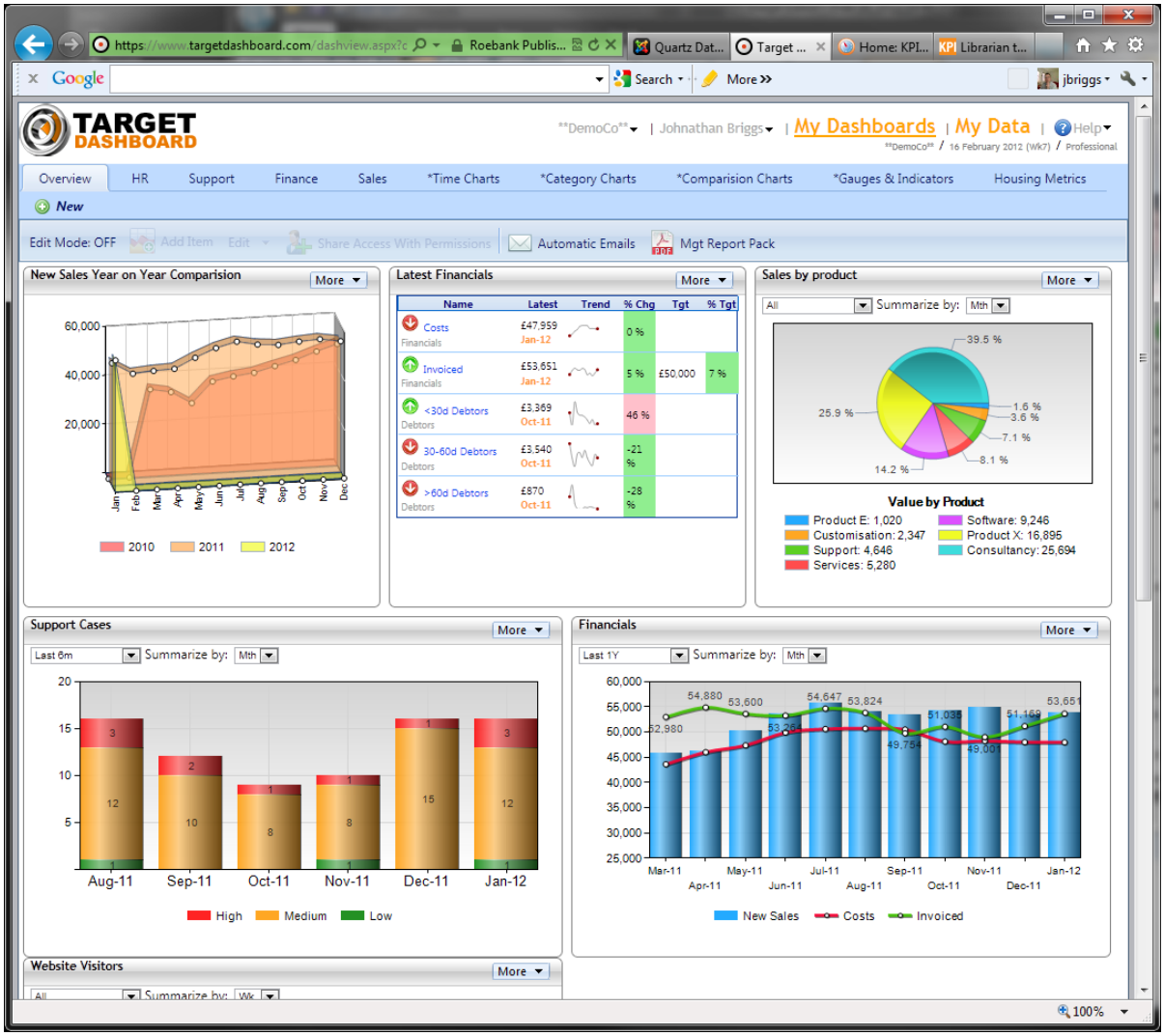
Electronic dashboards offer a world of new possibilities for reporting, with interactivity drill down and automatic alerting but they are very different to a paper equivalent.

- Electronic reports can be resized to suit a screen size, paper reports are fixed.
- Data is hard to follow and read on a screen, but easy on paper.
- You can't easily annotate or make notes on electronic charts.
- A screen resolution is 72dpi, but a printer is normally at least 300dpi. As a result, printing charts directly from a screen results is hard to read, poor quality chart text especially on axis labels and values.

KeyPoint: Dashboards and paper based reports may share the same sources of data but they should be designed separately.

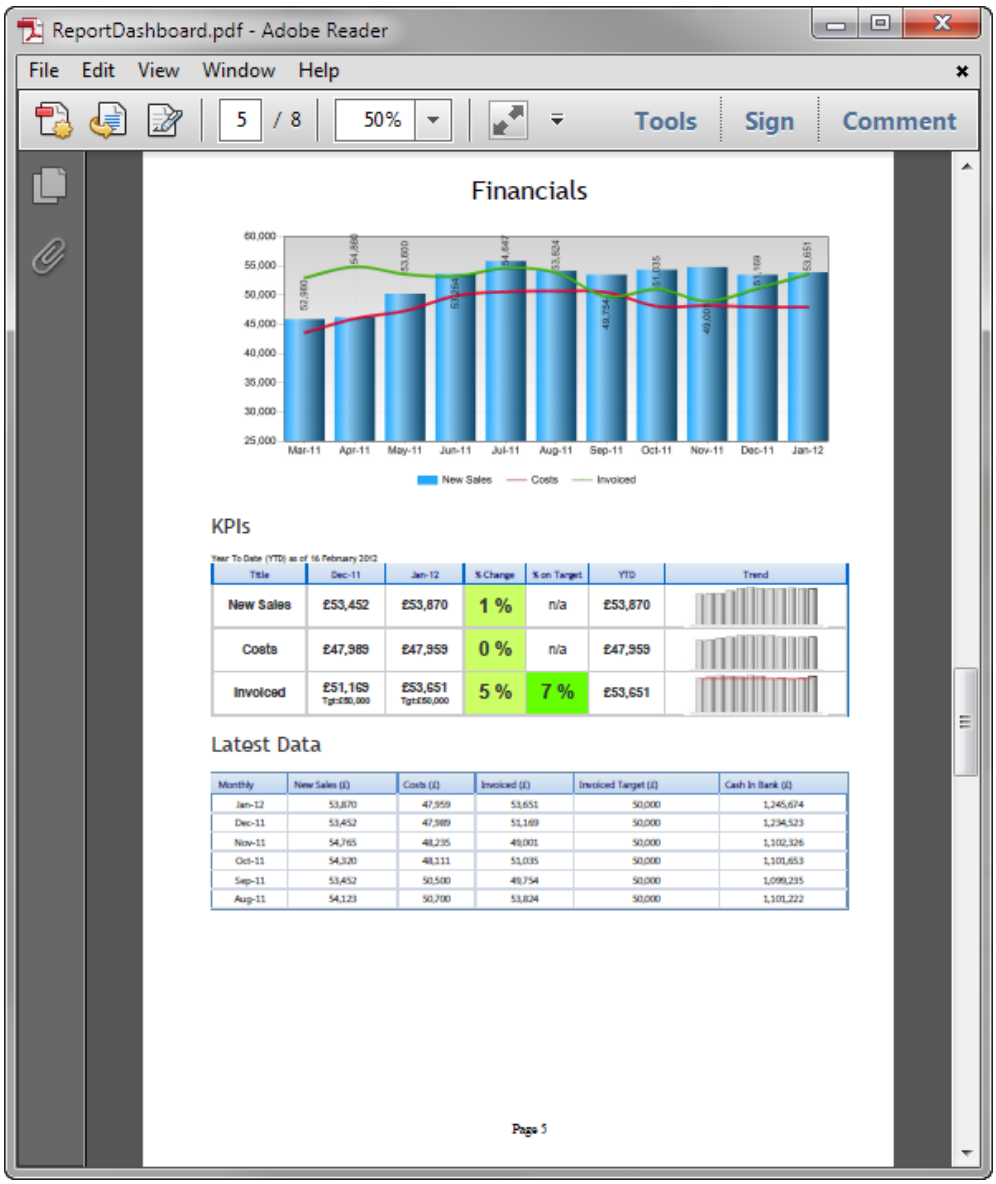
A Typical Example

To illustrate the approach of both paper based report and online dashboard reports complementing each other, here is an example.



This is an online dashboard. Each of the charts is interactive and designed to communicate our chosen message. You can drill into charts and also see values by hovering over points. This dashboard makes the most of its online platform.

However we also produce a paper based (PDF) version of this dashboard. Each dashboard item (chart, pie chart etc) has its own page in the report and not only includes the charts or visual indicator but also a score card for each dashboard item plus a data summary.



One page of eight from the paper based reports to complement our dashboard

Notes and Explanations

Sometimes our reports can easily unintentionally mislead, so it may be worth providing some form of reference notes. For example, say our departmental costs are extraordinary high this month because we sent everyone in the department on a training course. The hope is that this will boost productivity in future months. Adding notes or annotations to your reports will help outline planned or extraordinary events that otherwise would cause the reader to be misled by what they see.

Key Point: Don't Forget Paper! Format your reports for electronic and paper presentation separately.