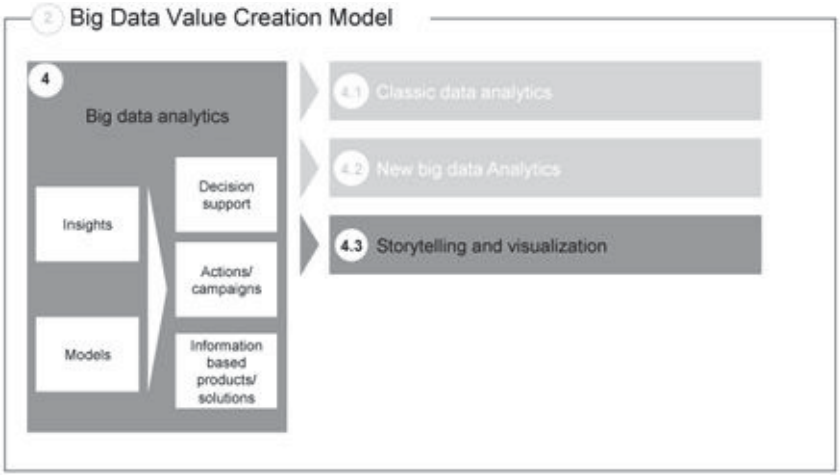
4.3
Creating impact with storytelling and visualization[1]



Introduction

In the preceding in-depth chapters we have discussed analytical techniques. In order for analysts to create impact with both traditional and big data analytics, how the analytical results are communicated is essential. One of the main dangers of analysis is that a report is not even presented, or ends up in the never-opened desks of managers and therefore never has any effect on management decisions. To have impact two issues are of crucial importance:

1. The presence of a clear storyline in which the message of the implications is concisely discussed
2. The use of powerful visualization of the analytical results (i.e. effective use of visual aids).

The importance of these two issues is increasingly present. The growth in the availability of continuous digital information results in people having less time available to attend to communications. Consumers as well as managers (being also consumers) switch between multiple devices continuously to read messages (e.g. on WhatsApp), emails, news apps, social media, etc. It is now very common that in meetings participants do not give their full attention to presentations because of being distracted by what else is being shown on their tablets or mobile phones. It is therefore very important that the presentations of research results are sufficiently clear and attract attention. Further, today's overload of digital information means that managers have to find ways of filtering the right information and interpreting the results. This information load is not new. Over the last two decades people have been addressing the growing importance of information stress. This arises because of the growing divergence between what information is available and what we can process (see Figure 4.3.1). It can be viewed as a black hole between data and knowledge that starts to exist when information is not telling us what we want and should know. For a long time, managers did not understand that they did not know. However, now they understand what they do not know and as a consequence they feel information stress (Wurman, 1989).

This increasing overload is calling for solutions. One of the solutions has been to work with infographics. These infographics are a typical way to make complex information more accessible for the reader. They exist in many forms. It might, however, be questionable whether infographics are effective. An infographic usually involves little structure and tells many facts in the form of text and figures. The graphs or pictures are mainly used as illustrations to make the information more attractive.

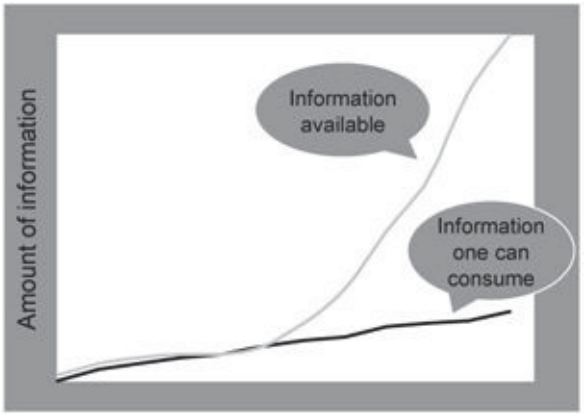


Figure 4.3.1 Information overload

We strongly believe in the combination of data, storytelling, and visualization. These three elements should strengthen each other in such a way that the information has impact (see Figure 4.3.2). If analysts, based on the strengths of their data and analytics, are able to tell a strong story and provide strong visualizations, they should have a strong impact. A kind of "sweet spot" is achieved, as strong visualizations and good story telling combined with excellent data and analytics will be well received by managers in an era of information overload. To achieve this multi-disciplinary skills are required. This is not easy, as frequently the analyst focuses on numbers and may be unskilled at communicating a strong story. We will discuss this general issue in more detail in Chapter 5.

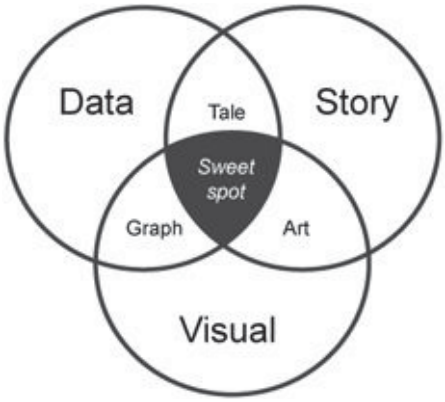


Figure 4.3.2 Sweet spot of data, story and visual

In this in-depth chapter we discuss how to build up a good storyline in analytical reports and presentations and how strong visualization can be achieved. Before doing so, we first focus on why many analytical projects with strong data and analytics fail to have impact.

Failure factors for creating impact

Many analysts have probably experienced carrying out a very nice study, but in the end their work did not change marketing strategies or tactics. Why does this occurs? It is definitely not the analytical quality that is causing the problem. The numbers have been crunched in the right manner, the right research questions have been studied, but still impact is limited. This is probably the greatest frustration of many analysts. Having no impact will in the long run threaten the positon of the analytical function within firms. Creating impact is also strongly required to create value with big data analytics! It is therefore very important to understand why reports do not have an impact and what typically goes wrong. We have already emphasized the huge importance of storytelling and visualizations. Based on our experience in analytical functions in many firms, we can identify some specific issues that frequently go wrong and reduce the impact of analytical exercises:

- There is no structure to the report. One frequently reports independent analyses that are not strongly related and as a consequence many unrelated messages are being communicated instead of a few strongly related messages.
- There are no strong and clear conclusions or messages. The findings are nice to know, but it is unclear what the manager should do differently after reading the report. One easily gets the "So what?" response.
- The reports include too many pages or slides. Moreover, the conclusions are only reported at the end of the report. The attention of the reader has died out by the end of the report and conclusions and implications are not read or mentally processed! The consequence is no impact.
- The main findings are good and understood, but combined with nice-to-know irrelevant insights. These insights distract the reader and result in less focus on the main message of the study.
- There are inconsistencies in the report. This creates a discussion on the content and may create confusion, reducing the perceived reliability of the results.
- The report focuses too much on the statistical details and reporting on why specific methods have been chosen. Although this is highly valued in scientific publications, managers have no strong interest in the details. Instead of reporting this in the main text, it can be provided as an appendix.
- The slides (or pages) are packed with many messages and as a result look very crowded. Assuming that normal humans have only limited processing capacity and are easily distracted, they can usually process only a limited number of points.
- Analysts frequently only report many numbers instead of graphs. Numbers are less easily processed than visual graphs.
- And if graphs are being used, they are too complex and provide too much

information. As a consequence it becomes a puzzle for managers to pick out the right information.

All these issues relate to weak communication. Improved communication can happen when analysts learn how to build a strong focused story for their results and are able to visualize them in the right way.

Storytelling

One of the basic principles of a good report or presentation is that it has a core message. This core message should be introduced with a specific situation and complication and should subsequently be underpinned with arguments. This approach is based on the pyramid principle as advocated by Barbara Minto (2009).[2] At the end of the 1960s she worked as a consultant at McKinsey & Company, where she focused on the development of methods to help their advisors to structure their presentations and reports. The pyramid refers to the principle that each advice should have a pyramid-like structure. At the top of the pyramid is the advice, and below the top structure, in different points or paragraphs, is the motivation. If the motivation is divided into multiple subpoints or issues a new pyramid starts to exist. Subsequently, one provides a powerful discussion (or description) of the complication to introduce the key-message. In our experience of giving advice to companies based on analytics, we have observed that this pyramid principle is very powerful. It really strengthens the impact of analytics. Schematically this results in the structure as displayed in Figure 4.3.3.

To understand why this method can be powerful, we first consider what is frequently being done when reporting. Normally, analysts start to discuss what they have done in a kind of chronical order. They want to show the manager their analytical road trip from problem statement to end results. The analysts only end their presentation or report with the important conclusions. They also want to be as complete as possible and aim to tell every detail. This is very logical. Analysts have been trained like this in universities. When writing a thesis, they start with a problem statement, discuss the theory, the data collection, the analytical method, the results section and end with important conclusions. Similar structures can be found in many scientific papers, and this may potentially explain the limited impact of scientific papers on practice (Roberts, Kayandé, & Stremersch, 2014). However, when doing this, the manager with limited time and attention only gets to the most important results at the end of the report or when the session is almost finished.

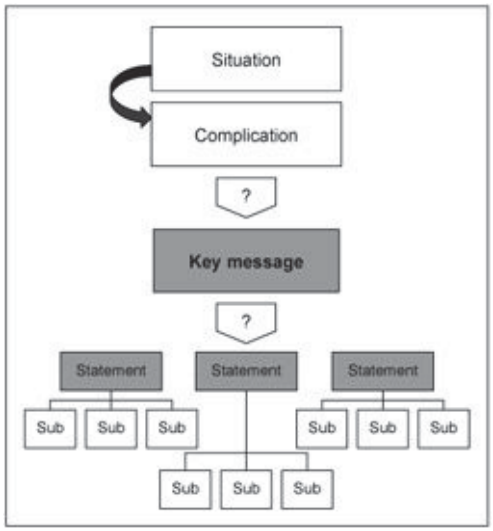


Figure 4.3.3 Building blocks for a clear storyline

A report has much more impact when its core message and the context are directly understood. By "directly" we mean that this should be set out at the beginning of each report or presentation. The core message can then be underpinned with a limited number of arguments—one frequently uses seven as a kind of rule of thumb, a kind of magical number based on Miller's law. The cognitive psychologist George A. Miller of Princeton University has shown that there are severe limits in our capacity to process information (Miller, 1956). His work has been interpreted to mean that the average number of objects an average human can hold in memory is around 7. This strongly suggests limiting the volume of messages and arguments being discussed.

The above discussion clearly shows that there is a mismatch between how an analyst presents an analysis and how it should be presented. An analyst frequently solves the problem with a bottom-up type of approach. However, effective communication suggests a top-down approach (see Figure 4.3.4). It is essential for analysts to understand this difference. When finishing a project and preparing the report and/or presentation they should get out of the analytical mode and move to the effective communication mindset. We have observed that analysts typically find this difficult, given that they tend to focus on details and frequently forget the overall picture and why the analysis is being done. It is therefore important to work in analytical teams, where effective communication skills are embedded in the team (see also Chapter 5).

Checklist for a clear storyline

The above discussion probably seems rather intuitive, but how can its conclusions actually be implemented? We take the schema as shown in Figure 4.3.3 as a starting point, and briefly point to some issues requiring attention.

Situation

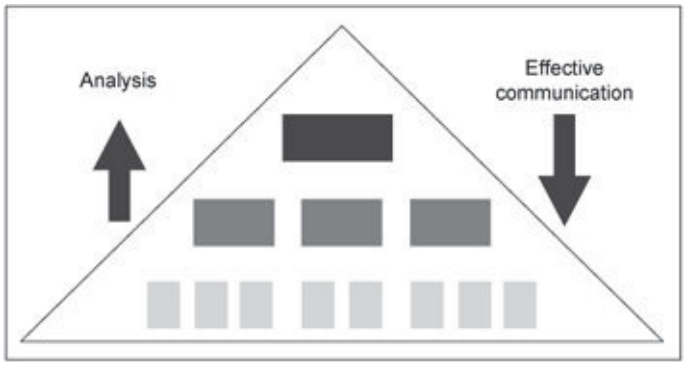


Figure 4.3.4 Analysis process vs. effective communication

When describing the initial situation, the following issues require consideration:

- Is the discussed situation not controversial? Does the description in itself raise specific questions and/or a debate? If the latter occurs it will be more difficult to discuss the core message.
- Does the audience recognize the described situation? If so, they will be more receptive.
- Is the situation description underpinned with figures and are these figures understood and believed in the organization? If the latter is not the case the situation description will be less effective. Still, figures showing specific problems in performance (e.g. decrease in net promoter score (NPS), or increase in churn rates) are very important to show the relevance of the report.
- Does the situation description create a complication and a specific research question?

Complication

The complication can be defined as describing the problem or challenge. This should be directly related to the situation description. There are some specific issues here to consider as well.

- Does the complication describe its potential impact for the organization? For example, in the case of decreasing churn rates, the impact could mean lower sales over time, decreasing market share, and lower profitability.
- Is the complication firmly underpinned with arguments and/or figures? Again we advise focusing on figures that can be directly linked to performance consequences. This will create a stronger belief in the relevance of the executed study.

Message

When discussing the message the following issues should be checked:

- Is there a single core message or are there many messages? We prefer to work with a single core message to have more impact of that single message.
- Does the core message create some curiosity or question? Curiosity will create attention and a desire to listen.
- Does the core message provide an answer to the complication?

Underpinning the message

When providing arguments for the message, it is important to assess what, why, and how

the argument is being used. Does the argument really make sense and will it provide a strong underpinning of the message? Specific issues that require attention are:

- Do the arguments link with questions a reader will ask when reading the core message? It is thus very important to understand how managers will react and what questions will come up when the core message is being read.
- Are the arguments complete and mutually exclusive? A complete list of arguments will show that the analyst has seriously thought about the provided conclusion. Mutually exclusive arguments means that there is no overlap in the conclusions or in the opportunities you found.
- There should not be too few nor too many arguments. A general rule of thumb is that there should be a minimum of two arguments and a maximum of five.
- One should start with the most important and convincing argument and end with the least important one.
- Are the arguments compatible? For example, when having strategic arguments, one should not have arguments that are more tactical. Or if arguments are based on facts, it is probably not wise to use sentiments as well.

In Figure 4.3.5 we give some examples of storylines that differ in their purpose. In example one we show how one can come up with business opportunities that achieve the business target.

Visualization

Visualization is of utmost importance in creating impact with data analytics. The reason is actually rather simple: "A picture is worth a thousand words." The ability to understand and extract value from data is much easier when it is done through data visualization rather than from looking at the raw data or the simple statistics of the data. In 1973, the statistician Francis Anscombe demonstrated the importance of graphing data. Anscombe's Quartet shows how four sets of data with identical simple summary statistics can vary considerably when graphed (see Figure 4.3.6).

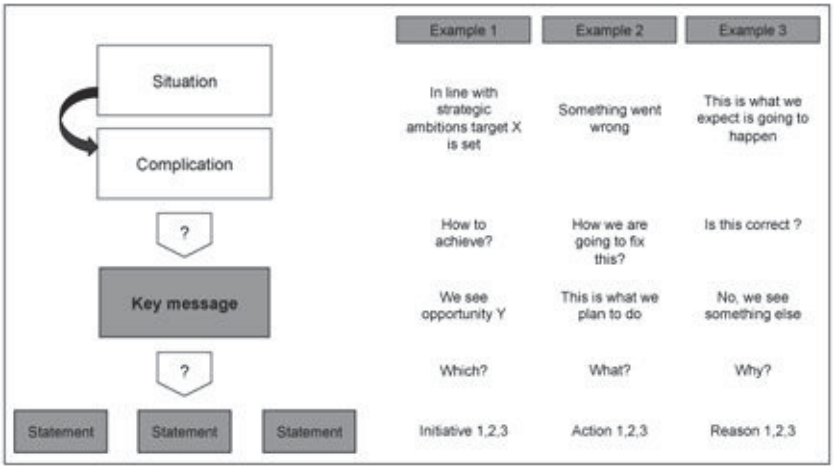


Figure 4.3.5 Examples of different storylines for different purposes

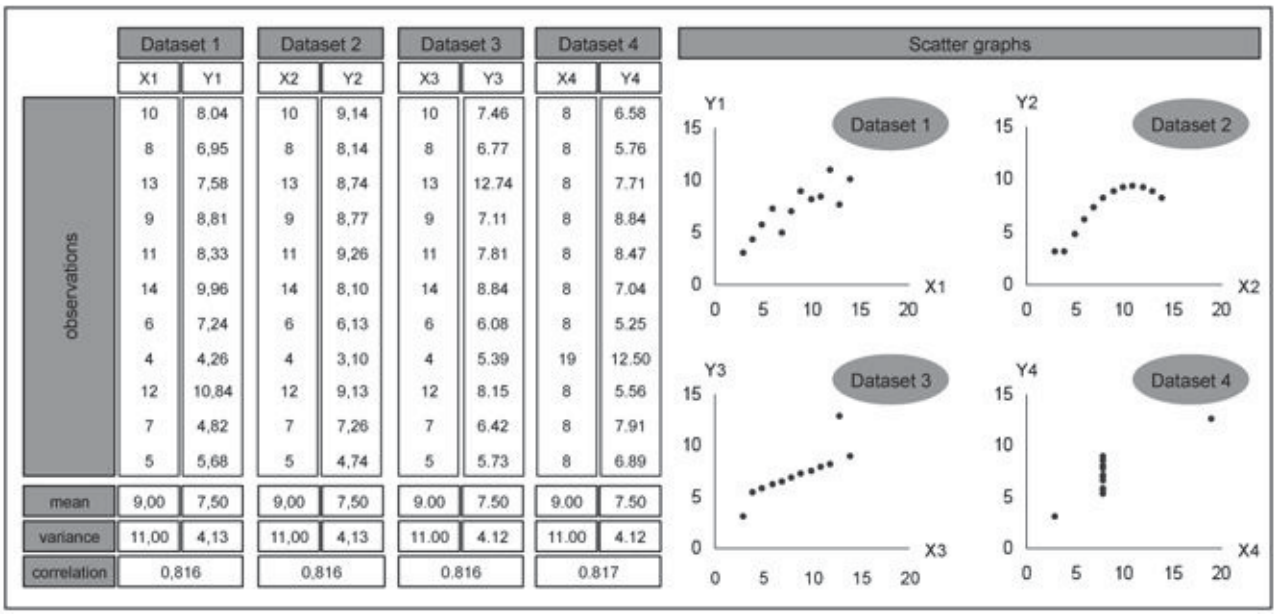


Figure 4.3.6 Graph of Anscombe's Quartet data table

Source: Adapted from Anscombe (1973)

There are also some statistics underlying these claims. For example, if information is transferred orally only 10% of the receivers can remember that information after 72 hours; this percentage rises to 65% if the information is visualized. This is called the "picture superiority effect" (Paivio & Csapo, 1973). So if you look at Figure 4.3.7 it is more likely that you will remember the right part (with the apple) than the left part.

Visualization in analytics is used for many purposes. Generally there are three objectives that can be achieved by visualizing data:

- Exploration of data
- Understand and make sense of the data
- Communicate the results of the analysis.

The first two objectives are generally parts of the analysis process. Before running all kinds of analyses it is wise to explore the data with visuals to help make sense of them. This can lead to immediate valuable insights and the understanding of potential relationships in the data. The last objective is clearly linked to the presentation of the results and creating impact. Of course in some cases visualization of data explorations can also be used in the presentation if it underpins the main message of the report. Visualizations in many forms can be used wherever results are presented, such as in reports, presentations, marketing dashboards, and websites. We will probably observe new trends in which apps will be used to visualize data.

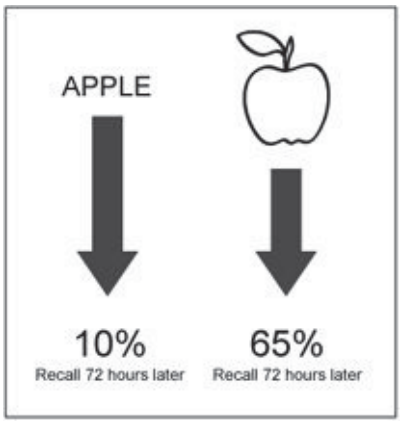


Figure 4.3.7 The picture superiority effect

In the next sections we aim to provide some practical guidelines on how to effectively visualize when communicating the results. We specifically focus on:

- Choosing the right chart type
- Design of the chart

We will also provide you with some practical tips and tricks to further improve the visualization.

Choosing the chart type

A common mistake when using a chart is to just choose a chart, for example a bar chart or a scatter plot, and assume that using such a chart in a report or presentation will be sufficient and it will be self-explanatory. However, this is frequently not the case. Choosing the right chart format to communicate the analytical results should be done carefully. The problem that researchers face is that there are many graph types, styles, and methods to present data. This makes it difficult to choose the right format. To find the right chart type, it is important to know that there are four core types to visualize data:

1. Showing a relationship between data points
2. Comparing data points
3. Showing the composition of data
4. Showing the distribution of data.

When choosing the right chart type it is first important to assess which graph type fits best with the message, the one aim to convey. In doing so, one has to consider the purpose of the graph. The above distinction in the various ways to visualize can be helpful in this respect. We will therefore discuss the different types of data visualization for each of these four types.

Relationship between data points

Figure 4.3.8 Relationship charts

A graph displaying a relationship aims to show the association or correlation between two or more variables through the data presented, such as showing the relationship between in-store sales and holidays. The most common "relation charts" that do this are scatter plots and bubble charts. But you can also think about geographic or geospatial graphs or even network charts when you want to show the relation between objects (see Figure 4.3.8).

- A scatter chart is used to show a relationship between two variables (X, Y) to determine if they tend to move in the same or opposite directions. An example might be plotting NPS (X) and retention (Y) for a sample of months.
- A bubble chart is an extension of the scatter chart, adding a third variable. This ends up being reflected in the size of the bubble. For example, when showing the relationship between NPS and retention, the size of the bubble might reflect the

number of customers at a specific data point.

- A geographic map typically shows the relationship between geographic location and a variable. For example, one might aim to show the sales volume per region or country. Geographic units can be countries, regions, Zip code areas, etc.
- A network chart typically shows the relationships between objects (see Figure 2.1.6) or individuals. This last type of visualization can be used in social network analysis, which we discussed in Chapter 4.2.
- In a circular network chart, the network chart is extended by showing the position and the importance of the objects. One concern is that these network charts become less clear when many objects are involved, and may even become unreadable.

Comparing data points

The basic idea of comparison of data points is that one aims to compare scores for (a set of) variables across multiple subunits (e.g. groups, time). For example, one might aim to show the sales per category per quarter. Or one may aim to show the conversion rates for different websites over time. Again, different types of "comparison charts" can be chosen (see Figure 4.3.9).

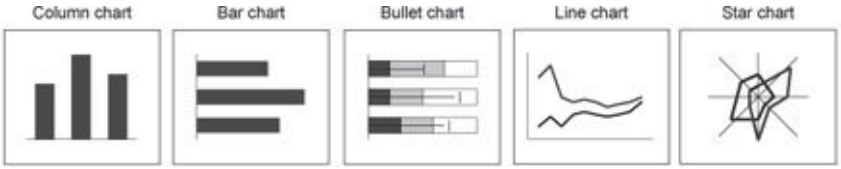


Figure 4.3.9 Comparison charts

If one has simple comparisons (e.g. sales per brand), then usually one of two rather similar chart types is used:

- A column chart is used when there is a limited number of subunits
- A bar chart is used when the number of subunits is larger, as more space is available in this graph.

For more complex comparisons, in which multiple measurements for multiple groups need to be compared, more complex graphs are required:

- A radar chart (also known as web chart, spider chart, star chart) is a graphical method of displaying multivariate data in the form of a two-dimensional chart of three or more quantitative variables represented on axes starting from the same point (e.g. the allocated budget versus actual spending of different departments, or scoring on product attributes of different designs). Sometimes it is hard to visually compare lengths of different spokes, because radial distances are hard to judge, though concentric circles help as grid lines. Instead, one may use a simple line

graph, particularly for time series.

- A bullet chart builds upon the bar chart and has been developed by Stephen Few (2006: 120–206). The bullet graph provides a primary measure unit (e.g. year-to-year revenues), and compares this measure with other measurement units (e.g. target). It also shows the context in terms of ranges of performance—for example, "good," "average," and "weak" (see Figure 4.3.10).

When comparing measurements over time, it is easy enough to use a column graph if only a limited number of categories for only a few periods (e.g. four quarters) is being considered. However, generally more categories and more time periods are considered. A line chart is especially useful if multiple time periods are being considered (e.g. sales development over the year by, say, weekly units).

Composition

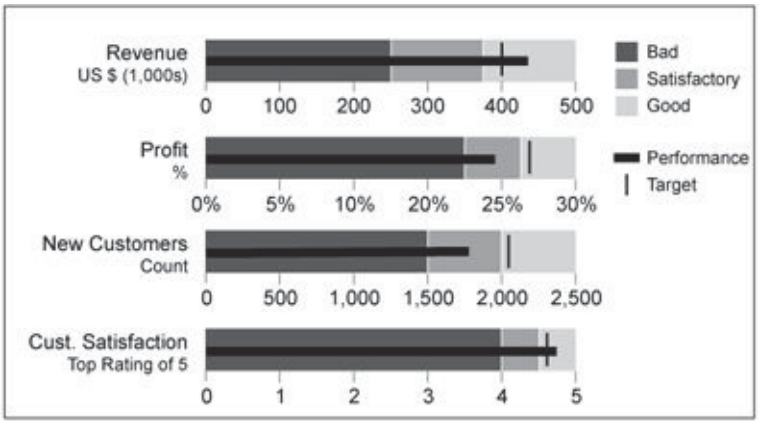


Figure 4.3.10 Example of a bullet chart

When using a composition chart, the aim is to show how the data are being built up out of different subunits. In its most basic form this results from a frequency table. For example, one might like to show the distribution of the origin of website visitors over different touchpoints (e.g. Google, Banners, Affiliates, Direct Load). Again there are many "composition charts" that can be used (see Figure 4.3.11).

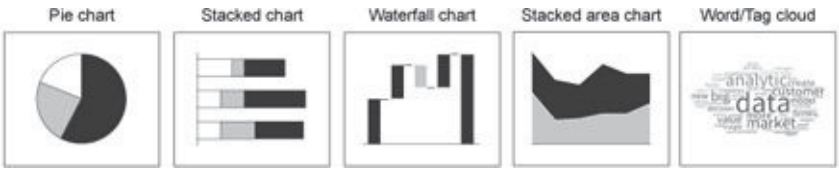


Figure 4.3.11 Composition charts

We would make the following observations about composition charts:

- The pie chart is very popular. It is very useful when a limited set of items or categories is being shown. A common mistake is to use it for many items. The pie chart quickly becomes unreadable and not informative! Some experts (e.g. Stephen

Few) believe that one should never use a pie chart, as especially with multiple variables they require a lot of space. Moreover, the pie charts might be difficult to interpret without providing exact figures.

- A stacked chart is a stapled column or bar chart. It can, for example, be used to show the distribution of sales per product per region, where the regions are shown in each bar and each bar represents a product.
- A waterfall chart is good for showing the breakdown of a variable in components. In contrast with the pie chart, this chart provides a good visualization of the size of each of the components. Moreover, it is also possible to show negative values, which is frequently impossible in many other graphs. We recommend using different colours for positive (e.g. green) and negative values (e.g. red). An example of such a chart is a breakdown of churn effects (i.e. total churn decomposed into inevitable churn, price churn, bad service churn, etc.). Extensions can also show developments over time. We frequently also use this chart to show the explanatory power of each variable in a regression equation.
- Tag/word clouds have become increasingly popular, with the increasing usage of unstructured data. Using outcomes of text mining exercises, the importance of each word can be visualized in a word cloud. The larger and the more bold the word the more frequently the word is observed. Generating these clouds is now straightforward using free online tools like Tagul, Wordle, or Tagcloud.

Some of the above charts can also be used to show changes over time. We have already mentioned the waterfall graph, but this can also be done with other graphs:

- In the stacked column chart, stapled columns per period can be linked with small lines to graphically show the time element.
- The stacked area chart becomes increasingly popular, as this visualization can show more changes over time. In comparison with stacked column chart many more time units (even continuous, e.g. sales per week/day over a year) can be shown, thereby even showing the development of multiple stacked subunits (e.g. brands in a category). This plot can be unclear, especially when there are a number of peak periods and down periods in the data. The ratios in the data can then become unclear.

Distribution

As the name suggests, a distribution chart (see Figure 4.3.12) is used to display how data is distributed and to understand outliers and categories that are outside the norm. One could, for example, consider the distribution of age groups of customers, distribution of revenues over all customers (is there an 80/20 rule?), or examine the power of a response prediction

model.

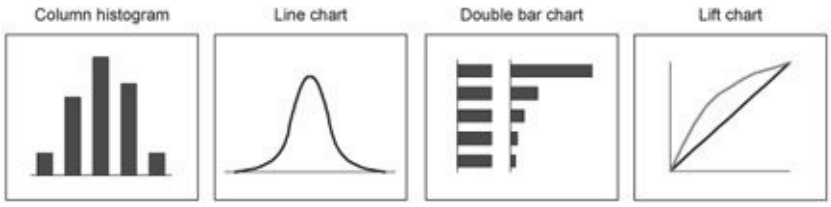


Figure 4.3.12 Distribution charts

The graphs used to show distribution are similar to those used for comparing variables. Graphs for a single variable are:

- A column histogram, which is a rather simple graph and is usable when there are a few categories per variable (e.g. age groups).
- A line histogram, which is similar to a column histogram but can handle many more categories (e.g. ages instead of age groups). In some cases plots can be used, but in general these are not recommended when there are large peaks and dips in the data (as discussed with the stacked area charts), because then they become hard to read.

If a researcher aims to display multiple variables and aims to show some distribution, the following graphs can be used:

- A double bar chart can be used if you want to compare, for example, the distribution of customers and distributions of revenues. This is also called a decile analysis.
- Lift and gain charts are a useful way to visualize how good a predictive model is. An example might be predicting direct mail response, where on the horizontal x-axis the number of customers is plotted, and on the vertical y-axis, the cumulative lift of the prediction model (see Chapter 4.1).

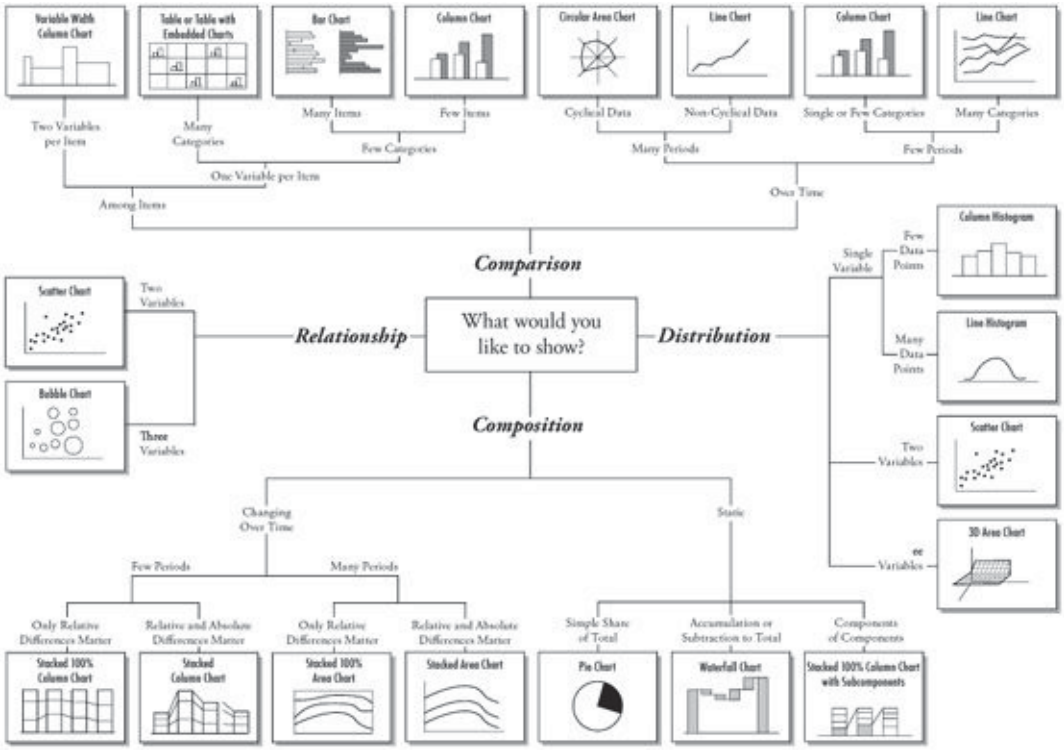


Figure 4.3.13 Chart suggestions–a thought starter

Source: Adapted from Abela (2008)

- The scatter chart provides a kind of cloud of points that have a position on the horizontal x-axis and the vertical y-axis. This may show something about the potential association between variables, as we already noted when discussing relation charts.

Andrew Abela (2008) has provided a nice choice process for the type of graph to be used (see Figure 4.3.13). Although not all the graphs that we discussed here are shown, this flow diagram can be very useful when searching for the right graph to use (see Figure 4.3.14).

Finally, we stress that our overview of graphs is not exhaustive. We have aimed to discuss the most important and most frequently used graphs. Although care has be taken when using these graphs, many of them can create more impact when incorporated into a report or presentation.

Graph Design[3]

After choosing the graph type one should consider the design of the graph. This is also essential, as the design will determine the attention the graph will get. Colin Ware, Director of the Data Visualization Research Lab at the University of New Hampshire, terms the basic building blocks of the visualization process as “pre-attentive attributes” (Ware, 2008). These attributes immediately catch our eye when we look at a visualization. They can be perceived in less than 10 milliseconds, even before we make a conscious effort to notice them. A list of pre-attentive attributes is given in Figure 4.3.14.

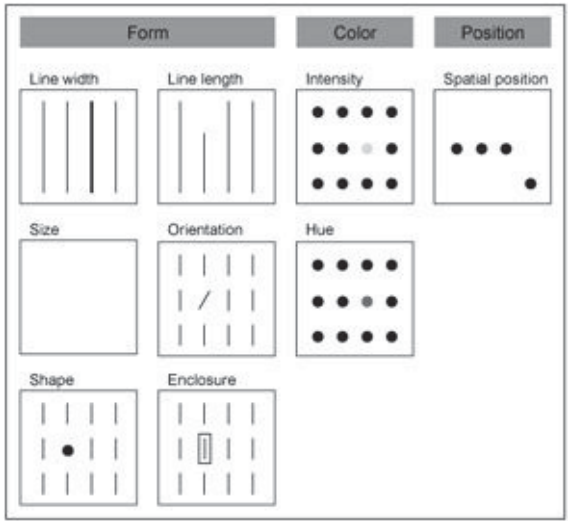


Figure 4.3.14 Pre-attentive attributes

Source: Adapted from Ware (2008)

These pre-attentive attributes can be useful when designing a graph, as they immediately identify a visual. These attributes are also the basis for patterns shown in a graph.

Analytical Patterns

Colin Ware (2008) states that:

> If pre-attentive attributes are the alphabets of visual language, analytical patterns are the words we form using them. We immediately identify the pre-attentive attributes in a visualization. We then combine the pre-attentive attributes to seek out analytical patterns in the visual.

The basic analytical patterns are displayed in Figure 4.3.15.

The basic attributes and patterns allow receivers to process visual information. However, it is not only the patterns that are useful. Beyond that one might want to highlight or emphasize specific patterns over others.

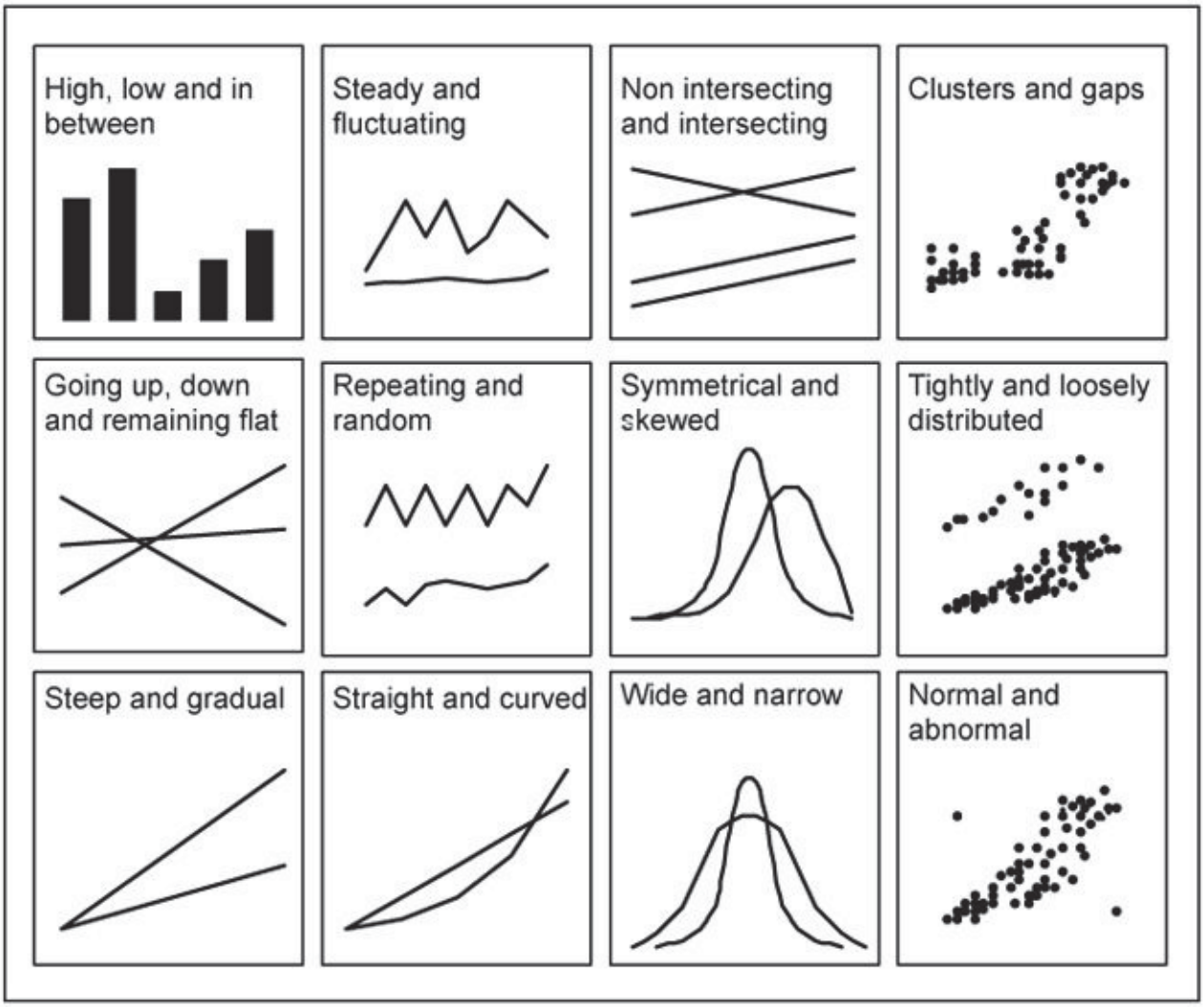


Figure 4.3.15 Basic analytical patterns

Source: Adapted from Ware (2008)

Tips and tricks

We have some tips and tricks to help the researcher working with graphs to do a much better job of creating them:

- Keep it simple! This is the golden rule. Always choose the simplest way to convey your information.
- Kill the grid lines unless they are absolutely necessary, or at least make them subtle so they do not distract from the information you're trying to present.
- Make sure your chart is centered on the data you want to present.
- Your axes should be clearly labeled, and should have units on them where necessary, so no one has to guess or infer what you're trying to say.
- Use colour, size, and position to help the reader to see what is important. Colour serves to highlight exceptions, not to enliven a dull dashboard.
- Remember, your goal is that anyone can pick up your chart, whether you're there

to talk about it or not, and understand what information the data are trying to communicate.

- One frequently believes that outcomes of regression models should be put in tables. However, regression models can also be shown in graphs, for example by showing the standardized coefficients for the most important variables in a bar chart or by showing the explanatory power of each variable in a waterfall chart (see Figure 4.3.11 for examples).
- We recommend researchers should try out a number of graphs and learn to "play" with them. This way one immediately learns the pros and cons of each graph, and it becomes easier to pick the right one.
- Be aware of misleading with graphs. If different scales are used on, say, the y-axis, small effects can become visually large. Gaining attention is not the same as misinterpretation of effects.
- 3D graphs can be unnecessarily confusing. The perspective information in the background can give the impression that it is less important than information in the front. Use compelling headlines and decks to describe the take-away message of the visualization.

Trends

We conclude with a discussion of some trends in visualization. In practice and in line with the growth of big data development we observe a stronger focus on design. We also observe that more infographics are being used. David McCandless is taking infographics and data-visualization to the next level. In his book *Information is Beautiful* (2010) he visualizes captivating and intriguing patterns and connections across art, science, health, and pop. Analysts frequently lack the skill for this kind of work and professional design artists are being used. We also see an increasing use of text-based graphs, such as word-clouds.

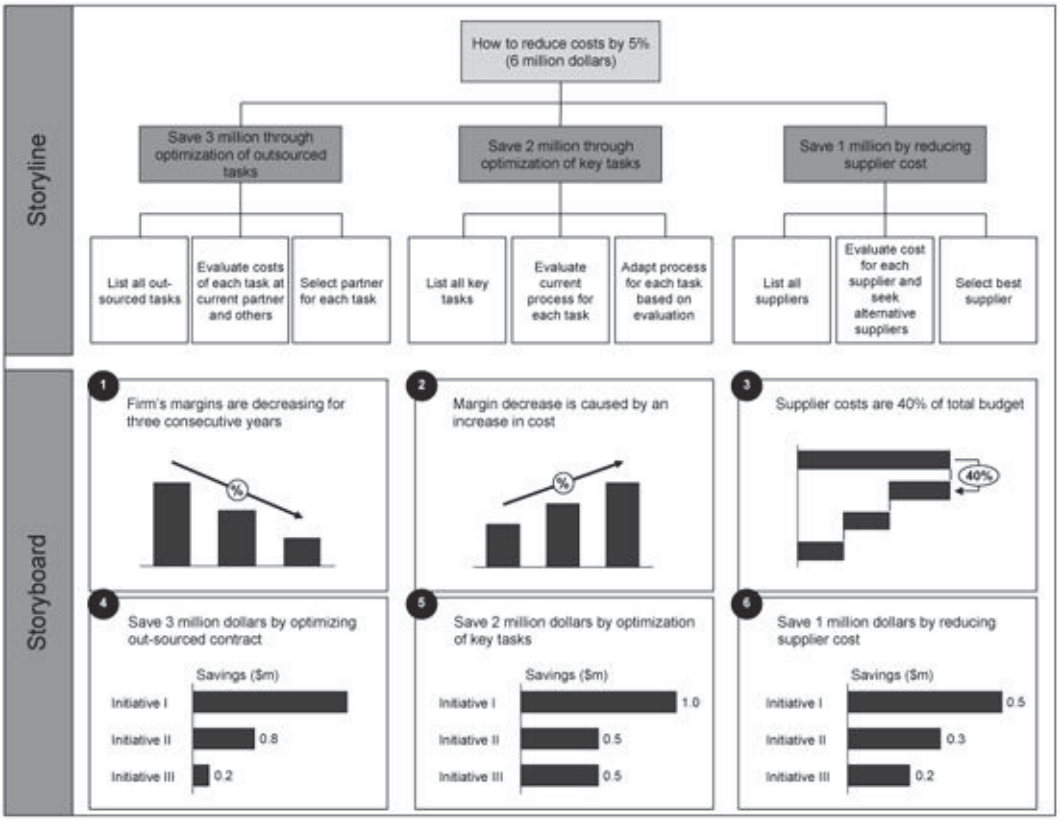


Figure 4.3.16 From storyline to visuals to presentation

We are probably aware of only some of the visualization trends. With the technological advances becoming available to help the display of visual effects, three-dimensional graphs will become more popular and insightful. Just watch the way Professor Hans Rosling handles a presentation, commentating on a moving hologram that illustrates the health, wealth, and population of 200 countries over 200 years in less than a minute (Rosling, 2007). We also believe that the growing importance of video means that presentations will also become more video-based.

Conclusions

In this chapter we have put forward the proposition that low impact is a general problem for many analytical studies. A very clear storyline and visualization are key-ingredients for creating more impact. In sum, we have the following clear recommendations for analysts; if they are followed, the result should be a storyboard in which the storyline and the visuals are integrated (see Figure 4.3.16).

- Start the presentation by creating a clear storyline.
- Write the storyline in full sentences:
    - What is the situation/complication?
    - What is the core message?
    - How can this message be underpinned?
- Continue by drawing some initial slides and visuals. Do not use a computer, but use a drawing board to stimulate creativity.
- Write out the headings of each slide in full sentences.
- Choose the right graphs to visualize the supporting insights.
- Using this basis, make a report/presentation.
- Use a critical counterpart to challenge the presentation.

Notes

1 Compared to other chapters, this chapter has a very strong "how to" focus. Attention to the creation of reports is very limited in the academic marketing literature. We have aimed to write a comprehensive chapter that provides the analyst with sufficient practical guidelines to set up an effective report or presentation. This is heavily based on our own combined experience of giving hundreds of presentations on our analytical studies for major companies.

2 There are other methods as well. However, we find that this method provides several advantages and focus on it in this chapter.

3 This section draws heavily on Colin Ware's study (2008).

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