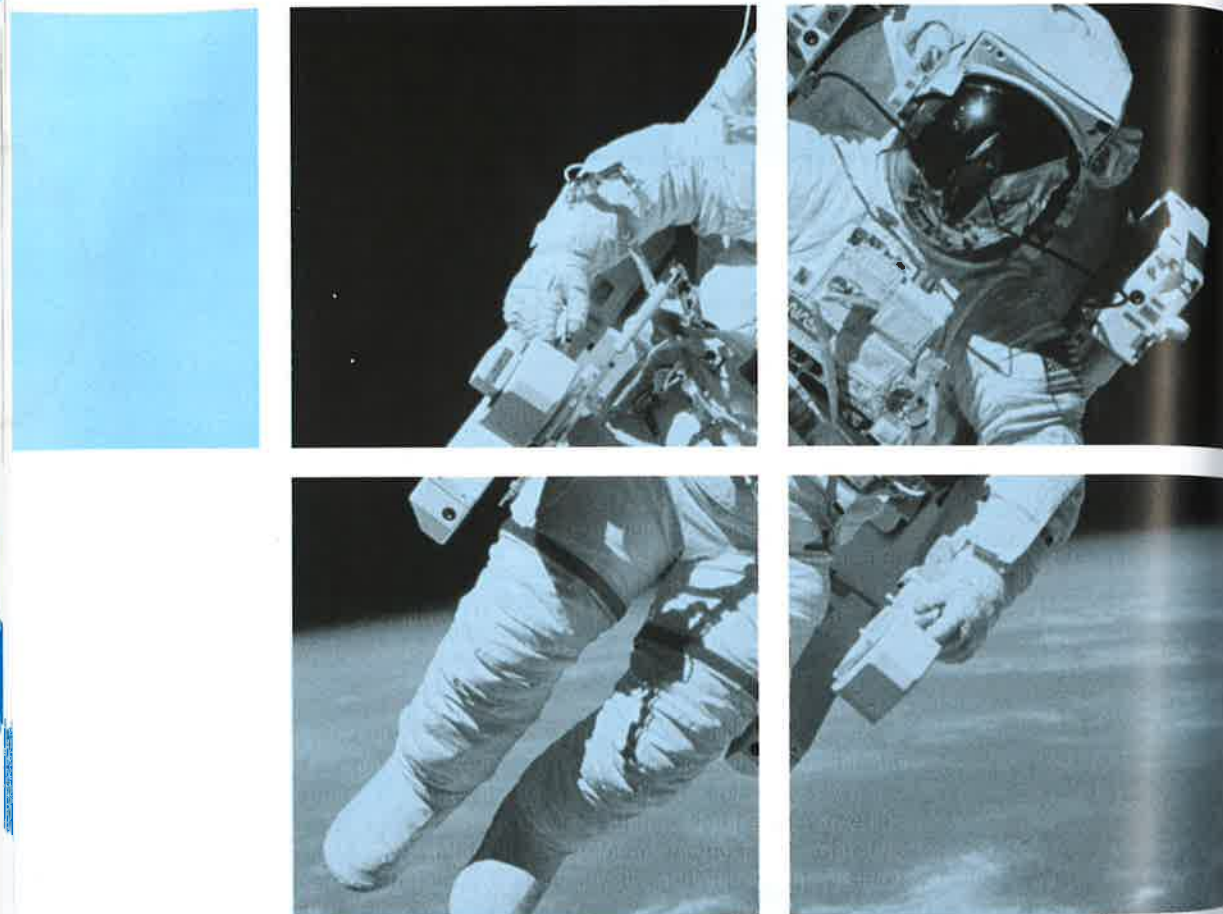




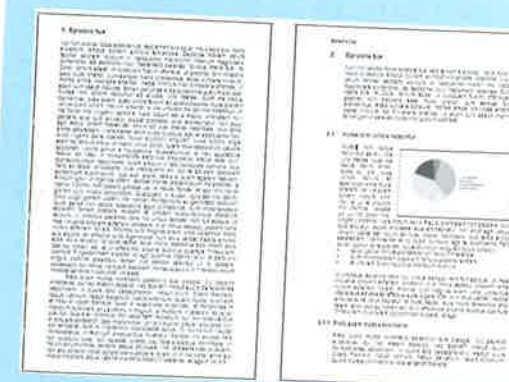
11

Illustrations

- 11.1 The importance of putting things in visual form
- 11.2 General guidelines
- 11.3 Suitable material for illustrations

There are two reports in front of you, one with illustrations, figures, drawings, schedules, and one with nothing but text. Chances are that you, just like most readers, will look at the report with illustrations first. Such a text is more inviting to the reader and yields up its information more quickly than a massive wall of words. Did you look at b first too?

EFFECT OF ILLUSTRATIONS



a Boring layout

b Layout with illustrations

11.1 The importance of putting things in visual form

Putting things in visual form (from tables to photographs) is part and parcel of the job of reporting and you should get into the habit of doing it as soon as you can. Temporarily inserting a quickly scanned or photographed sketch in the initial stage of the writing process will help you see what visual information will have to be created later. Texts with spatial information clearly demand at least one illustration, whether it be a map, an electrical diagram or a photograph. Making an adequate drawing or figure need not take much extra time at all.

Nowadays, readers expect you to make an effort to *show* them what you mean. They are used to texts being visually supported: communication in the twenty-first century is to a large extent *visual* communication, regardless of whether the medium is newspapers, magazines or the Internet. As such, a professional presentation is increasingly coming to mean one which includes visual elements. This does not mean, of course, that illustrations make a text better by definition. Some writers are so taken away by the countless possibilities of graphic programmes that their illustrations lose their functional value and tend to detract from the text.

Illustrations that are chosen for their appropriateness have a lot of advantages.

- They attract immediate attention.
- They ensure fast transfer of information.
- They ensure that information is remembered more easily.
- They emphasize main points convincingly.
- They make complex information accessible.

11.2 General guidelines

Three suggestions for using illustrations effectively are shown below, followed by some general hints on making illustrations.

11.2.1 Make sure the illustration can be understood independently of the text.

A reader must be able to understand figures and tables without further explanation. You should always indicate exactly what the picture shows, therefore, by adding a suitable caption, a legend, or, in the case of a table, explanatory notes. If so presented, the illustration can function on its own.

Make the captions or titles of every illustration informative. Do not write "The influence of anodising" but "The influence of anodising on the corrosion resistance of aluminium."

For a figure, the caption is usually put *underneath* the figure. With a table, the caption is usually put *above* the table. In reports with a wide margin, putting the captions next to the illustrations is an attractive alternative. The following examples show how adding legends and a more precise caption enable the reader to interpret a figure without needing to read the text. The figure in example B can function independently, in contrast to example A.

A NON-INDEPENDENTLY FUNCTIONING ILLUSTRATION

A single-lens reflex camera depends on four things for its operation: a. the lens, b. the mirror, c. the viewfinder, d. the light sensor. Where these four things can be found in the camera is shown on the following cross-section of an SLR camera. If we look through the viewfinder we will see the subject through the lens via a mirror and a prism. If we press the exposure button the mirror swings up and the light rays hit the light sensor directly (see Fig.1).

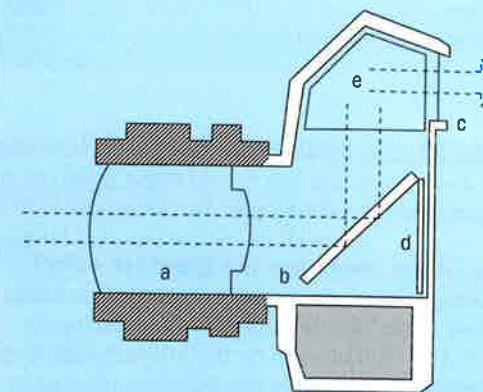


FIGURE 1 Single-lens reflex camera

B INDEPENDENTLY FUNCTIONING ILLUSTRATION

A single-lens reflex camera (see Fig.1) works as follows. If we look through the viewfinder of the camera, we see the object through the lens via the mirror and a prism. If we press the exposure button the mirror swings up and the light rays hit the light sensor directly.

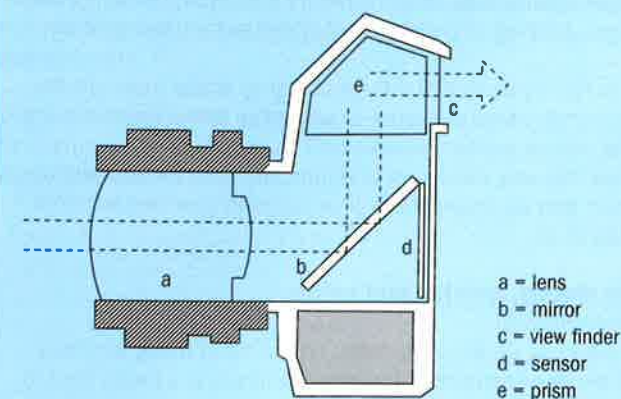


FIGURE 1 Cross section of a single-lens reflex camera (situation before pressing the exposure button)

11.2.2 Refer to the illustrations in the text

Give each illustration a number and refer to it at least once in the text. Illustrations that only serve a decorative function, such as cartoons, form an exception to this.

You can refer to an illustration in the following ways:

- Fig. 4 clearly shows the effect of ...
- Because of the pressure, the capstan has shifted to the left (see Fig.7).
- Tables 5 and 6 give an overview of the measuring results of...

Number tables and figures separately. Your software programme can make references and numberings automatically and you should make good use of this. It will ensure that your numbering is always right.

11.2.3 Put illustrations where they have the greatest effect

Illustrations should, of course, be as close as possible to the text passage they relate to. Only then will they really have the effect you are aiming for. For typographical reasons such as a lack of room on the relevant page they sometimes have to be shifted to the next one.

To save time it is sometimes more convenient to postpone the insertion of illustrations. Do reserve some space on the page so that you can have an idea what the page will look like.

Try to put the figures in a similar position on the page (for instance, at the bottom or at the top). This will create a restful effect. By not tying the illustration to the text but to a place on the page, the software can ensure that the text runs on normally while your illustration stays at the top or the bottom of the page.

There are three situations in which it is preferable to place illustrations at the back of the report in an appendix:

- If the same illustration is required in different places in the text (though placing the same drawing or photograph twice is sometimes a better solution).
- If the figures are so numerous and large that they would interrupt the text too much (but do place the most important of these figures in the text).
- If the figures are not very important and function more as an addition. But remind yourself that an unimportant illustration in your text is better than no illustration at all.

11.2.4 Work simply, quickly and safely

Three hints to finish off with.

- *Keep the illustration as simple as possible.* Do not try to make too many things clear in the one illustration. Too many variables in a graph tend to make it confusing. Use embellishments sparingly and do not choose a fantasy font for texts in an illustration. Extensive use of three-dimensional effects (such as adding shadows) does not improve an illustration. In the case of photographs, remove distracting elements with your software tools.

- *Use existing illustrations sensibly.* Often you can use illustrations that have been made by others and have been made available via the Internet (for example, stock photos). You can work much faster this way. You should always acknowledge the source. In the case of tables and the like, you should refer to the work you have taken the illustration from. In the case of photographs, drawings and cartoons, it is usual to mention the author.
- *Always work with copies of your illustrations.* Making a good graph, drawing or photo always involves a certain amount of effort. A photograph that you have altered to fit into one text you might need to use in another. Make sure you file the originals properly. Make a dedicated CD/DVD of your collection of illustrations.

11.3 Suitable material for illustrations

In this section we will look at a few different types of illustrations and suggest how could you use them.

11.3.1 Tables: present all the data clearly

Function

A table is an excellent way of presenting entire sets of data succinctly. The reader usually reads a table from the left column to the right. You should therefore put the search entry in the left-hand column. When presenting research data, the independent variable is put into the first column; the other columns contain the data of the dependent variables (the values measured).

Design

It is easy to make a table: most of the work is done by your word processor. Sometimes it pays to find out whether you should adapt the basic design. Do you, for instance, need all the lines in the table? Since the data (usually figures) is arranged in columns, the amount of white between the columns serves the same purpose as lines. Professional designers therefore often omit the lines – it makes the figure quieter, as the following example demonstrates.

With larger tables, it is advisable to insert a line of white here and there (for instance, every fifth row). This makes it easier for the reader to find his way in the table.

Example of a table – with a minimum number of lines

Mineral balance for agricultural land (millions of kg)

	2000	2005	2007	2008
Nitrogen				
Supply to soil	845	721	680	668
Supply animal manure	409	356	340	346
Fertiliser	330	269	248	230
Other supply	106	96	92	92
Removal via crop yields etc.	429	380	391	397
Net impact	416	341	289	271
Phosphorus				
Supply to soil	108	93	80	77
Supply animal manure	76	67	61	62
Fertiliser	27	21	16	12
Other supply	5	5	3	3
Removal via crop yields etc.	60	55	56	58
Net impact	48	38	24	19

Source: Statistisch Jaarboek 2010, CBS

Splitting long tables

A table may not fit onto a single page. If so, it is usually better to make two tables: this is clearer for the reader and a more elegant solution in terms of the layout of the report.

Alternatively you can let the table run on to the next page (not advisable, but sometimes it is the only way). In this case you will have to repeat the headings. NB: this can be done automatically by setting it up in your software programme. It is almost always preferable to put tables like this in an appendix.

Use possibilities offered by your software

Your software programme has countless possibilities to offer and you should make efficient use of them.

How to include your most recent data is a problem that people often come up against but which can be solved almost automatically. If you have to include new results at the last moment it can be extremely time-consuming to make changes to every cell of a table. It is possible, however, to link the contents of a table to a spreadsheet programme. By establishing a connection between the table in the text and the data file on disk, the data on the spreadsheet can be transported directly to the table in the text. Do not forget to include the spreadsheet when transferring the text to another computer.

Simple illustrations are also an option

If you have a small number of figures – too few for a real table – do not bury the data in the running text. You could create an informal minitable (without a number or a title) to present the information. For example:

DATA IN RUNNING TEXT

At the moment, commercially available solar cells convert a maximum of 15% of the sunlight that falls on them into electricity.

Monocrystalline silicium is usually used. But ongoing developments may mean that a theoretically possible conversion yield of 85% can be obtained.

At the moment, a conversion rate is reached of 21% with polychristalline silicium. Cells that are based on gallium arsenide have a very high yield. The yield of the very best laboratory cells is 35% at the moment.

DATA IN MINITABLE

At the moment, commercially available solar cells convert a maximum of 15% of the sunlight that falls on them into electricity. But ongoing developments may mean that a theoretically possible conversion yield of 85% can be obtained.

Yields:

- monocrystalline silicium 15%
- polychristalline silicium 21%
- gallium arsenide 35%

11.3.2 Graphs represent one particular aspect of the data

Function

It is, of course, possible to present your research data in table form, though the reader will have to work through a lot of information to get to the essence of the data presented. If you use a graph, that task will take your reader on average about 25% less time.

Why is this? It is because a graph represents a certain view of the data. Not all data need be presented as being equally important – only those aspects that you, the writer, regard as important. Your view of your research is passed on to your reader.

The other side of the story is, of course, that the reader is more easily deceived by graphs than by tables. Many readers appreciate it if you include a table showing the basic data in the appendix to your report.

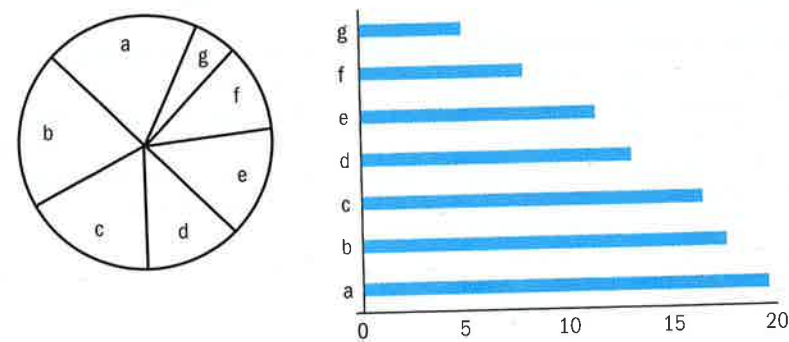
Design

Most calculating programmes (spreadsheet programmes, statistical programmes) can convert the data you collect directly into a graph. In the case of a presentation programme you will usually still have to type in the basic data for a graph yourself. The quality of the graphs of these programmes is almost always better than that of hand-drawn ones. If you only need a rough draft in the starting phase of your writing process a hand-drawn graph is usually quicker. Take a photograph or make a scan of your drawing to put it in the text.

When drawing graphs you should keep the powers of observation of your readers in mind. Research shows that people are less able to judge angles and areas than to judge positions along a longitudinal scale. Compare, for example, the difference between a pie chart and a bar chart (Fig.11.1). The

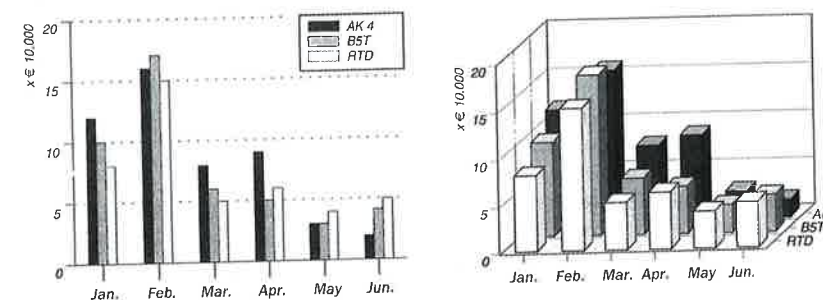
difference in length of the lines is more obvious than the difference in area between the pie pieces.

FIGURE 11.1 Difference in observed area and length information



With your software you can shape the same data collection in different ways. Without much trouble you can present the same graph in three dimensions. However, striving for effects like these is usually a matter of trying to impress: the graph often suffers from it. Compare the two examples in Fig. 12.2. Observe that the May figures in the graph on the right are hardly visible.

FIGURE 11.2 Difference between a two-dimensional and a three-dimensional realisation



Graphs can be manipulated relatively easily. By simply changing the scale on the axes you can present your readers with a steep or an almost level graph. A large degree of exaggeration is usually regarded as misleading, however. Do make sure that the effect you want to show is clearly visible. To demonstrate the point, we have put the most common graphs in a row in Table 11.1. The best graphic solution is obvious. Note that the 3D-versions add no new information and are sometimes even confusing.

TABLE 11.1 Overview of graph forms

Type of graph	Instructions	Example
Line chart	Choose if you want to show changes in a number of variable values and compare these changes with changes in one or more other variables. Choose a line chart for: - trends (exact figures are not important) - data collections that have many subsequent values - several data collections in one chart - data relating to periods - frequency distributions - estimates, predictions, interpolations or extrapolations	
Bar chart	A bar chart compares different entities shown as bars of different lengths (horizontally or vertically). The length of the bar is proportional to the amount. Choose a bar chart for: - comparing size or amount - differences within a variable at different times - differences between variables at a set time In the 3D version, some bars can disappear behind others.	
Pie chart	Use if you want to show the relationship between a part and the whole. Use them sparingly: a <i>line chart</i> or a <i>bar chart</i> usually portray the same information more clearly. Keep the following in mind: - only use for comparisons between a part and the whole - do not have more than five segments per pie chart - always put the labels outside the pie chart itself In the 3D version, the graph has to be tilted a bit, which causes some distortion.	
Area chart	Use if you want to show the contribution of several items to the total over a certain period of time. Just as with pie charts, the relationship between a part and the whole is essential here. Keep the following in mind: - limit the number of layers to a maximum of five - place the items with the least variation at the bottom: this makes the graph easier to follow.	

11.3.3 Diagrammatic representation: presenting relationships between data and concepts

A diagrammatic representation shows the relationship between ideas or events in a simple way. Make sure you retain this simplicity. You can usually suffice with framing a number of concepts with a square or a triangle and then connecting them with an arrow. It is then up to the text to explain what the schedule really means.

Simple conceptual schedule

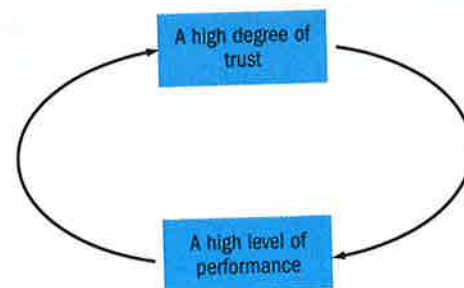


FIGURE The relationship between trust and performance

A diagrammatic representation can easily become complicated. The diagram in the next example aims at expressing the various factors that have a dynamic impact on a project. The way this is done creates confusion instead of clarity.

Confusing diagrammatic representation

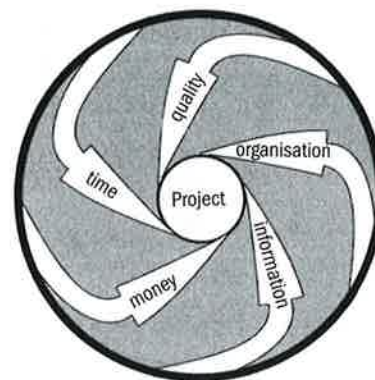


FIGURE Important factors in project planning

11.3.4 Photographs and drawings: representations of reality

A report that deals with tangible objects should always have illustrations. Although an illustration gives the impression of representing a neutral, objective vision, the writer can influence the reader by his choice of perspective, choice of detail, and choice of what is shown in the photo or drawing (and especially by what is left out). You can choose between such things as technical line drawings and photographs. With a technical drawing you can show the exact details the user needs and you can leave all irrelevant details out. By doing this you can also give a picture of things that do not exist as yet. In the case of photos, this is somewhat more difficult. With both technical drawings and photographs it is a good idea to keep a check on the size of the file you are adding to the text.

Photographs

Use photographs if you want to give the reader an impression of the situation as it exists in reality. A photograph does not only give an image of the object but of its surroundings as well. For general readers this often means that they can place the object in its particular context more readily. A photograph may also show unimportant details (a vase with flowers that just happens to be there, a rusty spot, an old-fashioned computer) which can sometimes lead to the intended effect (better orientation) being lost.

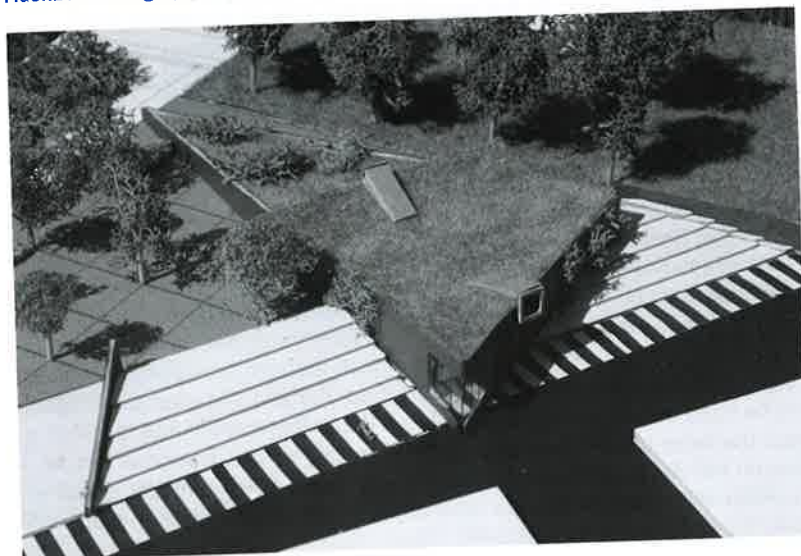
A digital photograph is like a drawing built up of a grid, the squares of which may be filled or not. Each square forms a dot in the drawing and is called a *pixel*. The more pixels on any given area, the greater the detail that can be seen on the illustration. This is called the *resolution* of the image. If part of a Bitmap of 2 by 2 centimetres is enlarged to 2 by 2 centimetres once more, the detail will not be greater – quite the contrary, the enlargement will be qualitatively inferior because the eye is starting to see the individual pixels and loses sight of the original image (see the following enlargement of the axle of the instrument in the example at the end of this chapter).



Fragment of the axle of the instrument

Hint for designers: take photographs of your work in your workshop; photograph all the immediate stages of your model. Photographs from 2 megapixels can be used in a report. In the case of photographs with more pixels it is possible to use part of the photograph. Rule of thumb: the width in centimetres of the photograph should equate to the number of pixels in the image divided by 100.

FIGURE 1 Photograph of an international stage



Source: www.amersfoort.nl

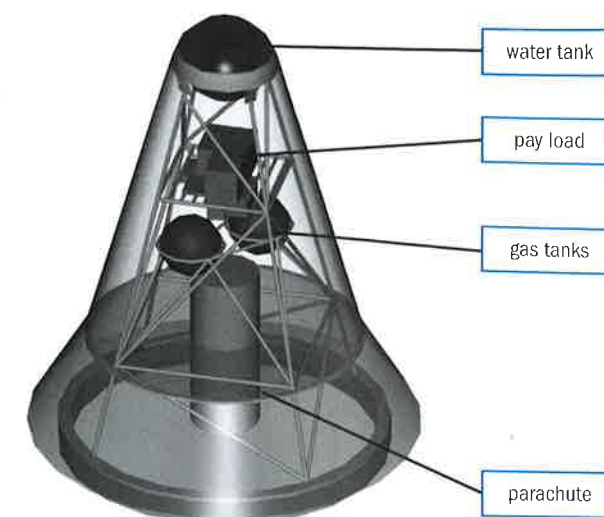
Hint: cut irrelevant details out of the photograph (make sure you are left with a picture with enough pixels).

Hint: use **copies** to work with. Make a **backup** of the originals and make sure you **keep** an overview. Rename **your** photos (not: IMG100456.jpg, but SuitcaseProject_firstphase_handles.jpg).

Technical drawings

Technical drawings are usually made with the aid of a CAD (computer-aided design) programme. Corrections, adjustments and additions are therefore less time consuming. A technical drawing is not built up of pixels but from a mathematical description of the drawing. For this the drawing is divided into a large number of mathematical primitives called **vectors** (lines, curves, circles, ovals, squares, etc.). With this descriptive method there is no quality loss when enlarging or reducing: a line remains a line, a circle stays a circle. To use a drawing in a report the drawing file has to be adapted by converting line pieces into pixels. When enlarging details, the resolution of the picture has to be kept in mind.

Technical drawing: a representation of something that does not exist as yet.



FIGUUR 2 Model for re-entry module

Try to keep non-relevant aspects out of the drawing. Place the names of parts in the drawing as close as possible to the parts concerned. If this makes the drawing cluttered, put the names in a legend and refer by means of numbers. If it becomes unclear where a certain name belongs to you can use a thin line (0.5-1 point) to connect the name with the object in the drawing.

Particularly with *instructions to laymen* a photograph is often clearer than a technical drawing. Make sure your photo shows clearly what the reader should do (task orientation: see the next example).