

# LIST OF REQUIREMENTS

## When can the method be used?

The List of Requirements is drafted on the basis of an analysis of all the information gathered on the design problem. A product design is 'good' insofar as it complies with the stated Requirements. A structured list of Requirements is particularly vital when designing complex products that involve coping with many aspects. In teams, a list is helpful in ensuring that you are all on the same page. This list can even serve as a contract between client and designer whereby you agree on the direction of further development. The Requirements keep evolving during the development process as the design proposals become more concrete and detailed.

## How to use the method?

In the beginning it is vital to make a structure that helps you to reach completeness. There are several tools for this. At first, the list will serve as a checklist. You must gather more information to ensure concrete and valid Requirements. For example when designing a playground, you need to know about how children play, ergonomic data, et cetera.

During a design project, new perspectives on the design problem frequently lead to the identification of new Requirements. Therefore, the Requirements should be constantly updated and changed. The outcome is a structured List of Requirements and standards.

## Possible procedure

### STEP 1

Make a structure based on one of the checklists in order to generate Requirements.

*Image left: What started out as a graduation project at the Faculty of Industrial Design Engineering in Delft resulted in a successful product: the main design requirement for the Senz® Umbrella was that it should be able to withstand wind speeds of up to 100 km/h! And it does. Photo: Senz®*

***A List of Requirements states the important characteristics that your design must meet in order to be successful. A List of Requirements describes concretely all of your design objectives and can be used to select the most promising ideas and design proposal(s) or combinations of proposals.***

### STEP 2

Define as many Requirements as possible.

### STEP 3

Identify gaps in your knowledge, that is, information that needs to be gathered by research.

- Put the Requirements into practice: determine their variables in terms of observable or quantifiable characteristics.
- Not: the price should be as low as possible. But: the consumer price should be between € 100 and € 125 > cost price between € 25 and € 30.
- Make a distinction between demands and wishes: demands must be met, wishes are used to choose between ideas and design proposals.
- Example of demand: the product weight should not exceed 23 kg because of labour rules.
- Example of a wish: the product should be considered 'comfortable' by as many test subjects as possible.

### STEP 4

Eliminate Requirements that are similar or do not discriminate between design alternatives.

Identify whether there is a hierarchy of Requirements. Distinguish between lower-level and higher-level Requirements.

### STEP 5

Make sure that your Requirements fulfil the following conditions:

- each Requirement must be valid
- the list must be complete

- the Requirements must be operational
- the list must be non-redundant
- the list must be concise
- the Requirements must be practicable.

## Limitations of the method

- Spending too much time on analysing and defining design Requirements can hinder your creative process. Employ an iterative approach, where you switch between sketching and defining criteria.
- Do not overly limit the possibilities of your design by defining too many Requirements.

## Tips & Concerns

- To make your Requirements more concrete, define them in numerical terms. For example, change: 'The product should be portable' into: 'The product should weigh less than 5 kg'. Sometimes it takes too long to reliably quantify something or evaluate it numerically. Therefore, this step is not a must.
- Mention the sources in the List of Requirements – publications, experts, own research, et cetera.
- Give your Requirements a structured numbering so that you can easily refer to them. Using Process Tree numbering immediately shows the reason for a certain Requirement.
- Use more than one checklist; checklists complement each other.

**REFERENCES & FURTHER READING:** Cross, N., 1989. *Engineering Design Methods*. Chichester: Wiley. / Hubka, V. and Eder, W.E., 1988. *Theory of Technical Systems: A Total Concept Theory for Engineering Design*. Berlin: Springer. / Jones, J.C., 1982. *Design Methods: Seeds of Human Futures*. Chichester: Wiley. / Pahl, G. and Beitz, W., 1984. *Engineering Design: A Systematic Approach*. London: Design Council. / Pugh, S., 1990. *Total Design: Integrated Methods for Successful Product Engineering*. Wokingham: Addison Wesley. / Roozenburg, N.F.M. and Eekels, J., 1995. *Product Design: Fundamentals and Methods*. Utrecht: Lemma.