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The importance of design, in particular as an industrial activity and the increasingly complex and dynamic context in which it takes place, has led to the wish to improve the effectiveness and efficiency of design practice as well as education. In this chapter, we discuss the nature of design, review the current state of design research, and explain the need for a systematic methodology for design research.

1.1 Design

Many definitions of design exist, very much depending on the culture and background of the author. When we speak in this book about design, we refer to those activities that actually generate and develop a product from a need, product idea or technology to the full documentation needed to realise the product and to fulfil the perceived needs of the user and other stakeholders. The perceived need may be social (e.g., transportation means) or technical (e.g., economic (e.g., manufacturing systems for mass production)). The impulse to start with a product can come from the market, such as needs of customers and competing products; internal needs of product development organisations, such as new developments, cost reduction, production adaptation and diversification goals; and from other sources, such as government, legislation, environment, society and politics.

The design process can be undertaken by individuals, industry, or a community, using various product development practices. The solutions resulting from these practices can be of both engineering and non-engineering nature, and may be physical (such as a coffee-maker or an aircraft), virtual (such as computer software), a plan or a process (or a combination of both (e.g., a mechanical system or a product-service system – a combination of an artefact and a process (service) – such as an aircraft leasing scheme or a mobile phone service). In this sense, the term product, as used in this book, signifies a much broader concept than conceived up to its commonly perceived limits – an industrial, often mass-produced artefact created by industry. Design is an activity that has an effect on nearly every sphere of human life (Pahl and Beetz 2007).