1.1 Functions of a building

In psychology the term ‘function’ is defined as ‘ability’ or ‘power’. The dictionary amplifies this definition by adding ‘special kind of activity’ or ‘mode of action’. Various authors have devoted their considerations to the functions of a building. In the 1960s De Bruijn, one of the founders of functional analysis as a discipline at Delft’s Faculty of Architecture, distinguished four different functions (Zeeman, 1980):

- **Protective function**: protection of people and property against harmful influences and dangers, e.g. wind and rain, inquisitive onlookers, interference.
- **Domain or territorial function**: buildings make it possible to operate in a place of one’s own, without disturbance from others. Key words are privacy, safety and security.
Social function: buildings create spaces and places in which people can carry on their activities optimally. Primary elements here are health, welfare, communication and quality of life.

Cultural function: a building must also satisfy requirements relating to the form and character of the spatial environment. The cultural function involves aesthetic, architectonic, urban design, planning and environmental factors. Culture also includes the notion of civilisation, one of whose implications are that buildings and the activities they accommodate should not be nuisance or cause damage to the environment.

The architecture critics Hillier and Leaman (1976) also distinguish four main functions of a building, but divide them up differently:

Spatial organisation of activities
A building needs to provide optimum support for the activities desired by properly arranging the available space: for example, by siting related activities next to one another and providing efficient communication between them, and by separating activities that are likely to conflict with one another.

Climate regulation
A building must provide an optimum interior climate for the user, his activities and his property. This necessitates a protective ‘filter’, separating the inside from the outside, and efficient plant. Inside the building, elements which separate and connect and the equipment of the different rooms must make it possible to adjust the interior climate of each room to suit its own particular use.

Symbolic function
A building can be seen as the material embodiment of the specific ideas and expectations not just of its designer but also of the client and the users. This makes it a cultural object, an object with social and symbolic significance and meaning.

Economic function
A building requires investment. It gives added value to raw materials. Maintenance and management form part of the exploitation cost, and must be set against income from rental or sale. It follows that a building, whether property or an investment object, has economic value and so an economic function.

The first functions named in the above lists can be summarised as utility functions. The last two functions refer to cultural functions. This division corresponds closely to the functions distinguished by the architect Norberg-Schulz (1965). A building creates an artificial climate, protecting people against the influence of weather, insects, wild animals, enemies and other environmental hazards. The building also provides a functional framework, within which human activities can be carried out. These activities are socially determined, and so give buildings a social meaning. A building can also represent something cultural – perhaps something religious or philosophical. Norberg-Schulz refers to the combination
of a building as a piece of social environment and its cultural symbolism as a ‘symbolic environment’.

Delft University of Technology’s Professor Dirken (1972), head of the product ergonomics department of the industrial design faculty, uses the terms primary and secondary functionality. Primary functionality means the utility value or effectiveness of a product. Secondary functionality is concerned with function as a bearer of meanings, as for example a building as a means of expressing status, evoking a sense of beauty or representing the kind of experiential values that are described in terms such as ‘pleasant’, ‘pleasing’ or ‘attractive’. Ekambi-Schmidt (1972) calls this ‘affective functionality’. Others call the function of form to evoke a sense of beauty as the ‘aesthetic’ function.

1.2 Functional quality

Quality is the extent to which a product fulfils the requirements set for it. ‘Functional’ refers to the function or functions performed by something, in this case a building. Thus, the functional quality of a building means its ability to fulfil the functions envisaged for it. Van Dale’s Dutch dictionary defines functioneel [related to the English ‘functional’] as ‘suitable for its purpose’ and mentions functional design as an example. Here the term is mainly used in connection with making possible and providing spatial support for the use envisaged. Webster’s Dictionary provides a similar definition, defining functional as ‘...connected with, used to contribute to the development or maintenance of a larger whole, designed or developed chiefly from the point of view of use’. Thus, functional quality can be defined as the extent to which the building and the constructional means applied make possible and provide a proper level of support for the utility function or the activities envisaged.

The functionality of a building does, however, also depend on the extent to which its spatial and physical qualities support the other three functions listed by Hillier and Leaman – the climatologic function, the cultural function and the economic function. A climatologically unsatisfactory building is not user-friendly. A high cultural value can increase a building’s utility value. A building is only functional when resources (ground, construction and materials) are used efficiently and the building is arranged effectively and efficiently. In a wider sense, therefore, the functional quality of a building can be defined as the extent to which it provides a proper level of support to the desired activities, creates a pleasing interior climate, has a positive symbolic or cultural meaning and contributes to a favourable economic return and an optimum price–performance ratio.

In practice, however, it is usual for the expression ‘functional quality’ to concentrate on the first of these functions. If a building is being discussed as a climate regulator it is much more usual to talk of the quality of the building
technology or building physics. Symbolic value is generally considered to fall under architectonic quality or be treated as aesthetic quality. Experiential value falls under the same heading. The relationship between quality and cost is often treated as a functional aspect (efficiency of design), or as an economic issue.

Summarising, it can be concluded that functional quality refers primarily to a building’s efficiency, practical usability or utility value, taking into account the financial means available. Functional quality requires a building to have good accessibility (‘access for all’), to provide sufficient space, to be arranged efficiently and comprehensibly, to be sufficiently flexible and to provide spatial and physical conditions that will ensure a safe, healthy and pleasant environment. More details are given in Chapter 6.

1.3 Architectonic quality

The term ‘architectonic quality’ is used both in a narrow sense and in a wider sense. In architectural journals and discussions on architecture, architectonic quality is generally linked primarily with visual and compositional qualities and symbolic or cultural meaning, so that it comes to be seen as complementing or sometimes even contrasting with functional quality. Take, for example, an observation like, ‘Functionally the building is well thought out, but architectonically it is poor’. According to Delft University of Technology’s Professor Carel Weeber, quoted by Van Dijk and De Graaf (1990), a building can be perfectly sound even if it lacks architectonic interest. A building’s architectonic quality is not determined by the professionalism with which it was built, but by the part it plays in architectural discussion. A building only becomes architecture when it is discussed; i.e. when it plays a part in cultural discussion. Weeber believes that the fact that a building is well thought out professionally is not enough to make it a piece of architecture. It remains unclear whether the converse might also be true – whether one can speak of architectonic quality in cases where the user requirements are satisfied insufficiently or not at all, and the workmanship is unsound. Tjeerd Dijkstra, former government architect, is very explicit on this point. In a paper on architectural policy entitled Architectonische Kwaliteit (Architectonic quality), dating from 1985 and adapted in 2001, he explicitly links architectonic quality with utility value. In his view it is essential that the form of a building is derived from the user requirements and the possibility of achieving efficient construction with available materials and techniques and taking into account the urban design context. And this should be done in a way that is both stimulating and appealing (Box 1.1).

Similar to Dijkstra’s view is the opinion of Van Rossum and De Wildt (1996). These authors studied the relationship between the way a commission is awarded and the architectonic quality achieved. With the help of four groups of questions, three architecture critics judged the architectonic quality of 18
buildings. They also emphasise the relationship between form, function and construction, consistency and context (Box 1.2).

**Box 1.1 Components of architectonic quality, according to a former government architect**

- Utility value: the extent to which the building is suitable for the use envisaged suggests this use and gives it an extra dimension.
- Clarity and complexity: the composition of the building should structure the way it is perceived, making it clear, comprehensible, recognisable and, in due course, familiar. At the same time the building should be stimulating, which requires a degree of complexity. Complexity exists when a composition combines a number of different themes: for example when the structure of the building derives not just from its function but also from its urban design context.
- Object and context: internally, this refers to such things as the treatment of the transition between public and private, between collective use and individual use; externally, it refers to the contribution the building makes to (and the influence it exerts on) the quality of public open space.
- The way in which use is made of architectonic resources such as size ratios, materials, texture, colour and light.
- Associative meanings.

*Source: Dijkstra, 1985/2001.*

**Box 1.2 Components of architectonic quality, according to a number of architecture critics**

1. *Building, function and context*

   What was the context in which the project had to be completed? What was the nature of the site? Did the site have special qualities? Did it impose special requirements, tacitly or not? Was there any conflict between programme and site? Does the building add quality to the site or has it damaged its original quality? Does the building as realised satisfy its intended function? Is it a faithful translation of that function? Or is it more than that; does it add something, because of its expressiveness and spatial quality? Does it elevate the required functions to a more poetic level, so creating new associations and meanings?

*(Continued)*
2. **Internal consistency**
How is the building’s function reflected in its spatial organisation? Does it conform to a particular typology or does it raise questions about a particular typology? How is the spatial quality of the building perceived? Is the visitor ‘led’ through the building by a consistent spatial configuration? Is there a ‘story’, a ‘thread’ running through the development of the interior space: introduction, development, tension, gradual transition, in-between, contrast, climax, surprise? Do important rooms perform important functions?

3. **Form, function and meaning**
Is the form a translation or expression of the internal spatial structure? Can the internal structure be deduced from the exterior? Or does the external form live a life of its own, independent of what goes on inside? Does the form say anything about the content? Does the building as a whole display a consistent form? Is the chosen formal vocabulary worked out consistently in all its components?

What part is played by the constructional technique? Does it determine the form or serve it? Is it emphasised or hidden away? Does it use its own metaphors, based on its own logic, and if so does it evoke some relevant meaning?

Does its form give the building a meaning that is legible to all? Does the form express what it is: a house, a theatre, a church, a factory, an office, a government building? What is the meaning of the building in its context, particularly in its urban context? How does the building relate to the buildings which surround it? Does it act in this relationship as subordinate or coordinator? Does it allow itself to dominate or does it fit in discreetly? Does all this tie in with the meaning of its function in the given context? Does the building express different meanings at the same time? Does it achieve a synthesis of complex content with clear expressive form, a simple form in which complexity is nonetheless perceptible?

4. **Special factors for government buildings**
How does government use architecture to present itself? How does it use buildings to present itself or its services to the population at large? Should it be dominant, neutral or self-effacing, haughty, stand-offish, receptive or friendly, firm, confidence-inspiring or provisional, ephemeral? What means, what metaphors will allow a building to express these different characteristics?

How does the building relate to public space? Does it contribute to the determination, arrangement or character of public space? Does the building express a particular view of culture or society? Does it make a statement about how society works or how it ought to work? Has the building sufficient poetic quality or is it sufficiently innovative to serve as an example?

*Source: Van Rossum and de Wildt, 1996.*
The paper *Ruimte voor Architectuur* [Space for Architecture] (WVC/VROM, 1991), prepared jointly by the Ministry of Culture and the Ministry of Housing, Spatial Planning and Environment, uses the terms cultural value, utility value and future value. Utility value refers to the extent to which a building or space serves the desired potential uses. Cultural value refers to criteria such as originality, expressiveness, relationship with the environment, value as a piece of cultural history, design quality and experiential quality. Future value relates to the sustainability of the building and its surroundings and also to such matters as suitability for other purposes (flexibility) and value over time (value as a piece of cultural history).

According to Cold (1993), a lecturer in architecture in Sweden, quality cannot be treated as a static, objective, rational or logical concept. Experience of quality originates in the confrontation between the individual and the object, building or place. It concerns the characteristics of the individual, the object and the situation. Architectural history, with its various and changing aesthetic expressions and styles, does not offer unambiguous answers to the question, ‘What is quality?’ We should therefore concentrate more seriously on the authenticity of our own time and not just imitate architectural expression in order to solve the current longing for more significant and aesthetically stimulating architecture. To this end, Cold offers three recommendations. We should:

- sharpen our awareness and study the message of time, place and quality in architecture, so that contextual understanding can inspire us to work creatively;
- train our sensitivity and develop ‘a refinement of the senses’, so as to experience, try out and create a new cognition; and
- learn about the relationship between people and the environment, so as to widen our knowledge and understanding of ‘the purpose of architecture’.

Cold (2001) refers to Stokols (1988), who distinguishes three fundamental approaches to architecture:

1. Minimalist – building as protection against climate, enemies etc.
2. Instrumental – architecture as an instrument to achieve behavioural and economic efficiency.
3. Spiritual – physical settings are viewed not as tools, but as ends in themselves, as contexts in which important human values can be cultivated. This third approach requires empathy and an understanding of general human needs, the concept of place (physical, social and symbolic), the technical and economic premises relevant to the realisation of the design concept and the cultural and artistic courage needed to create spiritual architecture.

All these opinions make clear that architectonic quality is an umbrella term, covering various aspects of quality. It is more than just aesthetic quality or cultural value. Although quality of use can be studied and defined on its own, this component is an inseparable part of architectonic quality in a wider sense.
1.4 Phases of the building process

To ensure that the building will actually support the desired activities, proper attention needs to be paid to the utility value in all phases of the building process (Fig. 1.1). The following sections take a brief look at these phases.

a. Exploratory phase

The first exploration of the building task takes place in this phase. Why is there a need for housing (or re-housing)? Is the task one of building a new building or rebuilding or extending an existing building? What is the level of ambition and to what extent can this ambition be achieved within the available budget? It often happens that the first ideas are developed in this phase, based on anticipated use. For example, a hospital might suggest a comb-shaped structure, because of the flexibility (extensibility) that such a shape provides. A much-used metaphor for a psychiatric establishment is a small village, because of its homeliness and smallness of scale. The final result of this phase is a paper setting down basic principles, including information about organisation, the main requirements and a feasibility study.

b. Programme of requirements or brief

In the programme of requirements the housing need is worked out in more detail, in the form of performance requirements for the location, the building, the rooms,
the components of the building and the facilities to be provided in the building itself and in the grounds. The programme needs to be supported by a careful analysis of the organisation, the activities to be housed and the necessary or desirable special conditions – in short a functional analysis. This subject is discussed in more detail in Chapter 3.

c. Design

If everything has gone well, the desired quality of use will have been carefully defined in the programme of requirements. If there is no detailed programme of requirements, a functional analysis still needs to be carried out. There is generally a great gap between programme and design. Often all kinds of design variants are possible, each satisfying the programme of requirements but leading to a radically different quality of use. Important activities in this phase include the study of reference projects (precedents), analysis of the urban design context, consideration of the implications of that context for the design, and checking design proposals against the programme of requirements and other measures of quality of use. A more detailed treatment is given in Chapters 4 and 5.

d. Specification, selection of contractors and building

The materialisation and detailing of the design mainly takes place in the design phase and is then finished off in the specification phase. It is extremely important that the effect of the choice of materials and detailing on quality of use is properly checked. Considerations of quality of use play a less emphatic role in the selection of contractors and during the execution phase. Nonetheless, care must be taken to avoid errors made during execution that may cause problems later on in using the building.

e. Use and management

When the design has been realised, it is important to check whether the resulting building comes up to expectations. A careful analysis of how well the building functions is a useful way of identifying possible bottlenecks. This applies not just to the period immediately after the building has been handed over but also to the medium and long term. An evaluation of the building in the use phase (Post-Occupancy Evaluation or POE) can be used in making adjustments to the building itself and to assist design processes elsewhere. This can lead to well thought out guidelines for programmes of requirements and designs for related buildings, particularly when several buildings are involved in the evaluation. For a more detailed approach, see Chapters 5 and 6.
1.5 Conclusion

As this chapter makes clear, the functional quality of a building can be understood in different ways. In the narrowest sense, it refers merely to the building's utility value: the extent to which the building makes possible and supports the use envisaged for it. In a wider sense, it involves the ability of the building to perform all kinds of different functions: utilitarian, climatologic, cultural, symbolic, aesthetic, economic and so on. The same holds true for the concept of architectonic quality. In the narrowest sense it primarily refers to perceptual qualities, cultural values and symbolic meanings. In a wider sense it is the extent to which an original, stimulating, efficient and cost-effective synthesis is achieved of form, function and technique (Fig. 1.2). As a consequence, the architectonic quality of a building in its widest sense includes the following sub-qualities (Van der Voordt and Vrielink, 1987):

- Functional quality or utility value
  The usability of the building in practice: the extent to which the building is suitable for the activities that have to be able to take place inside.

- Aesthetic quality
  The extent to which the building is perceived as beautiful, stimulating or original; the way it is experienced, whether as pleasant, cosy, spacious, homely or simply

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**Figure 1.2** Architectural quality as an integration of functional, formal, technical and economic issues.
commercial; the extent to which it is seen as a piece of culture, e.g. whether it is representative of a particular style or period of building; and the extent to which the building evokes different meanings.

**Technical quality**
The extent to which the foundations, the load-bearing structure, the shell, the infill kit and the technical services satisfy technical requirements relating to such matters as strength, rigidity, stability, sustainability and limited need for maintenance. An important component is physical quality, the extent to which the building is capable of achieving an attractive, safe and healthy interior climate, measured in terms of temperature, humidity, illumination, natural lighting and acoustics, in an environmentally friendly and energy-saving way.

**Economic quality**
The extent to which financial resources are applied effectively and efficiently, i.e. the price–performance ratio. If the building is viewed as an investment object, its economic quality also depends on the level of return achieved.

The chapter has also made a preliminary exploration of the part played by functional quality in the different phases of the building process. It has made clear that attention to functional quality is an important part of every phase of the building process. Because careful programming, design and evaluation are so important, they are each treated in detail in a separate chapter. The aim is to assist the reader to work methodically, systematically and in a properly thought out way, using instruments that are suitable to the task, e.g. design guidelines derived from experience with existing buildings, checklists, itemised procedures and quality standards.

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