Chapter 3
The Different Meanings of Home

Mid pleasures and palaces though we may roam,
Be it ever so humble, there's no place like home;
A charm from the sky seems to hallow us there, Which,
seek through the world, is ne'er met with elsewhere.
Home, home, sweet, sweet home!

Home Sweet Home by John Howard Payne, 1882[1]

The dissemination of automation technology stayed behind expectation in private home. Some of the potential reasons for this were addressed in the introduction chapter and in the previous chapter which turned a spotlight on the human aspects that would have to be considered to a higher extent. This chapter is devoted to the characteristics and the relevant aspects of the home environment, and its relationship to the people living and acting in it.

3.1 The Dimensions of Home

The following presentation of historical and trans-disciplinary perspectives on the home is serving as another basis of the WISE home. One important aspect to start with is the differentiation between the terms home and house. In the smart home literature, specifically in the technology-oriented parts of it, the terms are often used interchangeably. As Dekker [1] emphasises, it is important to make a clear distinction between them, although the borders between the two terms are fluent. The term house covers only the physical characteristics of a "*spatial unit in the built environment*" [2]. The archetype of the house, crystallized with the ascent of the bourgeois, is a free-standing house with a yard, occupied by a single family. The labelling of house as a castle, which is still used in the saying "*my home is my castle*" today, originates from these times, when the British law included passages such as "*The Englishmen's house is his castle, home as haven comprising both house*

[1] http://www.stthomassalisbury.co.uk/content/pages/documents/1295352003.pdf

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and surrounding land." [2, p. 65] and defined the idealized form of dwelling. This type of living environment constituted a "*badge of the middle class membership*" for a long time [9] and housing statistics reveal that this idealised picture of a dwelling is still representative today. For example, in 2012 [3] about 41 % of Europeans lived in flats, but the majority of living environments still correspond to the ideal (34 % live in detached and 24 % in semi-detached homes) coined in the past, though the concrete percentages differ between countries. Physical characteristics are by far not the only relevant ones in regard to a home, however they are influential [2]. Beside the "*outer shell*" of a house, room design and furnishing, and the technology present in a house all enable and constrain behaviour, actions, and relationships, in the sense of "*... buildings that shape us*" as Churchill expressed it.

The outer shell of a house serves an important role as borders, it enables a separation between public and private, and contributes to making the home a comfortable, secure, and safe space. The house constitutes a refuge, a haven [4], a shelter [5] wherein one is removed from public scrutiny and surveillance [2, p. 71]. Public spaces serve non-kin relationships, the home is characterized by close and caring relationships [6]. The notion of *home* includes, beside the physical ones, also psychological, cultural, normative, moral, and social aspects. Moore [7], citing Benjamin 1995, defines home as:

> ... spatially localized, temporally defined, significant and autonomous physical frame and conceptual system for the ordering, transformation and interpretation of the physical and abstract aspects of domestic daily life at several simultaneous spatio-temporal scales, normally activated by the connection to a person or community such as a nuclear family.

In this interpretation the home is considered an entity interwoven with its inhabitants to such a degree that a separation between the two components, seems *fictious*: "*self and world merge in the activity of dwelling*" [6]. A similar understanding of the home is found in the work of the philosopher Heidegger [8]. The specific relationship between people and their homes can be observed in the etymological emergence of the words related to dwelling. The word *building* has its origin in the Germanic word *buam* – which is synonym to dwelling. Dwelling is seen as the sheer representation of being of "*us mortals*" in the world. The meaning of "*I am*" is, "*I dwell*" [8].

Whereas the type of dwelling has, as emphasized above, a historical relevance on the societal level, the home has an important individual historical perspective. It is not only that the current home is *shaping* life, homes of the personal history are all associated with memories [2]. The birthplace home plays a specific role in this regard [1, 7, 9]. Not all associations with home are positive, as is the case for people who have been abused or mistreated [10]. These kind of things often happen in the seemingly-protected environment of the home, but, fortunately, for most of us the home is one "*the most cherished place*" [2].

Compared to other places, such as working spaces, the home is differently organized. For example, when the home is built, designed or re-designed, the foremost consideration is not for the workflow that will take place. Besides the

functional aspects, the home is also organized on aesthetic aspects, practical considerations, economic aspects or moral principles [6] that support the manifold purposes the home has to serve. Whereas workplaces are associated with clearly-defined tasks flows, the home is characterized by unplanned and parallel activities, unclear procedures, and changing roles [11]. Other goals are relevant at home. Consider, for example, efficiency. While this plays an important role in work contexts, it is *overrated* [12] in the home. In principle, at home there are no external role expectations [5]; responsibilities and task allocations are not so clearly specified as they are in the workplaces, and they may change depending on current requirements. Despite that freedom and flexibility, changes in society and technical progress forced changes upon role models and expectations. One example of this is gender. The roles of women in general and as technology consumers in particular has risen up, and women continue to play an important role in this regard [13]. This focus persists, specifically with technology aimed at supporting household chores [14], which make the home a women's workplace or even a "*girl's prison*", as G.B. Shaw put it. Despite the clear focus of women as the user, most technologies are still being designed by men. Conventional technologies as well as smart home technologies are also usually established by men and overlook women. The work of [15–18] show that this is still the case in other areas of application and in different cultures.

The complexity of the home. which can only be addressed at this point on a very superficial level, is difficult to grasp. Rybczynski [19] describes it like an onion. In appears simple on the outside but has many layers the complexity of which are not observable from outside. If each layer is observed separately, sight of the whole is lost. It seems that this is exactly what has happened in the history of home technology: the layers of the home have been separated, and researchers have been focussing too much on the technical layer instead of concentrating on the *big picture*.

An indicator supporting this assumption is given by [20] who points out that the diffusion of technology led from the workplace to the home. It can be hypothesised that this has been done by extracting technology from the original context and deploying it to the new one. That this strategy does not work can be observed on several examples in the past, when plants and animals (such as the Japanese knotweed) were unreflectedly exported to other regions of the world. The consequences were not observable and the whole ecosystem has been disturbed. As has been mentioned in the introduction, such long term consequences of technology are not observable yet. But a thorough understanding of the context the technology is deployed can probably prevent negative consequences.

However, the criticised deployment strategy is partly understandable, specifically from an economic viewpoint, because it supports the requirements of a technology-oriented engineering approach such as standardization, replicability and configurability. The approach has its eligibility, specifically in industrial settings. In order to ensure criteria such as efficiency and effectiveness, buildings in the industrial or in

the public sector are designed on the basis of these requirements. Floor plans are organized on the basis of repetitive patterns and rooms are prepared for standard installations. Such standardization enhances the effectiveness and efficiency when buildings have to be equipped with electrical power, heating, sanitary installations, and also smart technology. Moreover, the maintenance, control and regulation of the technical infrastructures can be handled more efficiently when based on standardized patterns instead of on individual solutions or custom designs. People responsible for the selection, the planning and the purchase of these infrastructures are probably not their users. The same applies to computerized equipment and software. Specific staff is available to handle initial configuration and ongoing maintenance in a centralized way. People staying in the buildings, for example, for the purpose of working, probably do not have an influence on the purchase, installation, and finally, the use of smart home technology.

Automation technology attained a suitability for mass production after the pioneering work of the 1950s and 1960s, which will be discussed in detail in Chap. 4 and could be quite successfully introduced into the functional building sector. In these circumstances automation technologies supported the achievement of goals related to efficiency and effectiveness. For example, energy consumption can be optimized by automating the systems in the building in order to coordinate the control of temperatures, lighting conditions, standby energy consumption, etc. Another benefit is the enhanced maintainability. Janitors, administrators, and technicians can remotely observe departments, rooms, and singular devices; can identify errors, and might even be able to solve them remotely by controlling the whole system from their desk. But as, for example, pointed out by [21], even in these circumstances, the real procedures deviate significantly from their technical specification and characteristics of the users play an important role. This will be illustrated with two examples showing the potential problems of a too technology-oriented approach even in work environments.

The first example relates to a laboratory which is located in a multi-unit research park. Built quite recently, the park is equipped with smart technology which, in principle, should not be of direct interest for the people working there. An automation system is installed which enables the remote-control of all devices present in the buildings. One example is the external horizontal blinds that serve as window shutters. If they are angled towards the building when it rains, the rainwater will run into the building's facade, which may result in cosmetic or even structural damages. To prevent this, all of the building's shutters are adjusted automatically based either on weather forecasts or on information provided by sensors positioned on the roof of the building. As a result, people sitting in their offices sometimes see the shutters suddenly adjusting themselves as though they were being controlled by the hand of the ghost. Of course, these adjustments happened regardless of whether bright sunlight might currently disturb people trying to read on a monitor, or watch a projection in what had been a dark room. This strange behaviour of the blinds finally led to the demand that some of the tenants of the park wanted to have the blinds removed.

A colleague who knows that I am researching smart technology provided me with information about the experience of a smart system that is installed on a university campus that was recently built in another city. The negative highlights of a report summarizing the experiences with the smart system so far are the following. The central control of the smart system is an incapacitation of the users. Heat, which is provided individually on a room-by-room basis, cannot be controlled individually. As a result, room-by-room installations to regain control to a certain extent, such as devices for humidification, have been added by the people working in the buildings. Control of the lighting is also centralized, and the lights in each room are automatically adjusted based solely on daylight conditions. Users frequently ask for light switches to be installed, so that they can reclaim some individual control. Maintenance costs are high because the entire system needs to be reprogrammed each time even if only light bulbs are replaced. If a door malfunctions, attempts to adjust the central door locking system (which consists of 1200 doors) require up to seven specialists.

Given these examples it is more than questionable to transfer technology from the context of functional buildings to the context of private residential buildings. Despite of the dangers, attempts in this direction are observable again and again. Figure 3.1 contains an indicator of how the limited perspective described above results in suboptimal solutions. The first picture is the workplace of a technician; a janitor surveilling a building from a central position. The other picture shows a typical control unit of a smart home control system. Even though the context of use is very different, the two designs are obviously based on the same concept.

As stated above, in contrast to industrial and public buildings, living environments are characterized by a reasonable diversity. Even on the physical level they differ in room layout, although there are some similarities, for example in regard to the types of rooms that are typically present. Confusing the standardized requirements that apply to public buildings with the requirements that apply to the home obviously leads to problems. An example of a conflict between standardization and individualism is illustrated in a report about the LeCorbusier house in Berlin. The architect Le Corbusier's became famous for his concept of the *machine-á-habite* (machine to live in) [22] which is based on the assumption that living environments can be standardized and do not change over time. In the Berlin flat this was not the case. Over the years the life developed a new and unique dynamic, which was described by [23] as follows: "*Like moles the people have undermined the structures and re-designed them individually*". The conclusion that [4] draws from this is that people do not want machines to live in, they want machines to live with. According to [5] research suggests that the concept of replication (an extension of the concept of living machines) does not match with people's meaning of *home*. It does not make sense to view the home with the lens of mass production, efficiency, and productivity. Approaches that follow this path have some parallels to Taylorism and the *man conforms* philosophy which were massively combated by psychologists such as Kurt Lewin, but do not seem to be exterminated yet. A home of the future, a WISE home has to be based on adaptive and flexible technology that supports current needs of the inhabitants, such as the possibility to design their environments

Fig. 3.1 Workplace of a person monitoring a complex environment and a typical smart home dashboard

themselves and can deal with the changes that will occur as a natural part of life [24]. These can be, for example, the progressing from single life to living as a couple, becoming a family with or without children, etc. Ingold ([6], p. 165) brings it to the point: "*Most fundamental thing about life is that it does not begin here or end there, but is always going on*" – circumstances that probably cannot be fully addressed by a pure engineering approach.

3.2 Bridging the Gap

Given the different perspectives addressed above – the individual perspective of the home with its variety of dimensions on one side and the industrial perspective of standardization on the other – they do not seem to have much in common. The first requires approaching the home from the viewpoint of the humanities: considering the historical, psychological, sociological and philosophical aspects. The second represents the industrial perspective from standardized buildings to home automation, emphasising the efficiency, maintainability and costs aspects.

The problem to overcome is that housing and dwelling are generic and objective and subjective and individual, all at once, and all in parallel [9]. Engineers seem to try to avoid the individual because of the difficulty of deriving common solutions in non-generalized environments, and the dangers that may result from the attempt. But what if the individual perspective is the important one? For each of us, dwelling is unique and experienced separately [9] and therefore it is difficult to fully understand the various needs and choices, the values, from an external and general perspective.

It appears to be quite difficult to combine the two perspectives within the home, but it may be easier than it seems. Standardization has become widespread, because it would be unrealistic to demand customised solutions for each and every home given the complexity and the costs that would result from this. We are all already living with standardisation in our homes, and if addressed appropriately, no general problems result from this. Electric wiring and connectors in homes have to be standardized, because of compatibility requirements of components produced by different manufacturers, so that they can be used in a variety of buildings, and under a variety of circumstances. Despite the variability of homes, the rooms and infrastructural elements such as doors or windows are standardised in a way to fit the *human size*. Despite this standardization, living environments allow for a sufficient degree of individualisation. Furniture can easily be bought off-the-shelf because, given that the measurements have been taking into appropriate consideration, one can safely assume that the standard piece will fit into the environment. Without such degrees of freedom, a certain furniture retailer from Sweden would not have been so successful. Products are obviously designed and produced with standardization in mind, but in a way that still leaves room for individualism. The concept of mass customization [25] is an approach that combines the both perspectives, individualism and standardization. Returning to the example of entertainment technology from the birthday story at the beginning of this book, one can clearly see the tasks that will need to be addressed in the future. In principle TV sets, DVD players, and satellite receivers of many different brands are compatible with one another in regards to their physical interfaces. The same applies to computing technology. Displays, printers, smart phones, and cameras can be connected to a desktop or laptop computer and will probably work, at least, after drivers have been downloaded. What is missing is the possibility on the software level that enables the combination and integration of devices that

have come from different manufactures and that are based on different interaction patterns. The WISE approach addresses the problems and shows examples how to support consumers to configure and program their homes themselves.

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